CORONET

Lyall Watson

author of the bestseller SUPERNATURE

THE ROMEO ERROR

'A brave, provocative and utterly fascinating book' SUNDAY EXPRESS

A Matter of Life and Death

THE ROMEO ERROR

Lyall Watson is convinced that it no longer makes *biological* sense to discriminate between life and death at any level. With life stretching its limits all the time through advances in technology the two states blend almost imperceptibly into one another. In *The Romeo Error* Dr Watson, a professional life scientist and writer, tries to build up a scientific framework for an understanding of what we mean by death.

This well-documented book is filled with information and happenings that are just as fascinating and incredible as those included in *Supernature.* As with *Supernature,* one needs only to remove the blinkers of limited experience and give way to a wide-eyed sense of wonder.

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John Naughton in *The Observer*

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They said that JULIET was dead.

NURSE: "She's dead, deceas'd, she's dead!"

LADY CAPULET: "She's dead, she's dead, she's dead!"

CAPULET: "Her blood is settled and her joints are stiff;
Life and these lips have long been separated."

ROMEO took their word, and his life . . . but he was wrong.

Or is the error ours?

The Romeo Error

A Matter of Life and Death

Lyall Watson

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Introduction

When I was ten years old, I went off by myself one day to a wooded ravine near our home where one could stand on the edge of a cliff and bounce a wonderful echo off a curved wall of granite on the far side of the stream. I had been planning the excursion for weeks and finally worked up enough courage to actually do it—to stand there all on my own, high above the trees and shout as loud as I could, the rudest and most forbidden word I knew. Now, a quarter of a century later, I cannot even remember what the word was, but I shall never forget the feeling. Writing a book about death makes me feel that way again.

Despite our new freedoms, death is still an awkward subject for discussion. Every day we display further evidence of our discomfort with it and of our continuing uncertainty about the relationship of life and death. With the one hand we try to put the dead "to rest", we console and propitiate them and attempt to avert their wrath; and with the other we try to simulate life by painting up their faces in a forlorn attempt to rekindle some last vital spark.

Our ambivalence is manifest in almost every field. We say that science and medicine are giving us dominion over death, but we really still believe that nothing we can do will change the date of that appointment in Samarra. There is a sense of rightness and inevitability in the story of the soothsayer Chalchas who died of laughter at the thought of having outlived the predicted hour of his death. If anything, our new technology only makes the dilemma even more difficult to bear. In September 1973, Samuel Moore was certified dead in Oakland,

California with a bullet in his brain. His heart was removed still beating and shipped by helicopter to Stanford where it was transplanted into another breast. When the gunman Andrew Lyons was charged a month later with murder, his lawyer insisted that the charge be altered to assault with a deadly weapon on the grounds that Moore could not be dead if his heart was still beating. That part of the case, at least, has now been settled because the heart in question has finally stopped beating altogether, but there is still some doubt as to whether the murder was done by the assailant or the surgeon.

As a biologist, I find this kind of ambiguity embarrassing. It may be old-fashioned, but I believe that a student of life should know where it starts and have some idea of how it ends. Hence this book. It starts from first principles and develops along the lines of a debate, as much for the sake of my own sanity as for anyone else's edification. I suspect that there are logical and biological flaws in many levels of my argument, but for the moment I am content to leave them there, simply because this *is* an argument and I hope that it will stimulate further discussion.

Exactly two years ago, I collected a ragbag of biological loose ends together and created a patchwork pattern which went some way towards establishing an objective natural history of the supernatural. I tried not to set any artificial limits to the field it covered, but looking back now I can see where I drew my mental lines. If *Supernature* was my Life Book, then this is its companion volume on Death and Afterlife. I start with what seems to me to be the most basic dilemma in the field, our inability to distinguish life from death, and find that when this is resolved it merely opens up a number of other problem areas—and every one of them turns out to be something that I had previously refused to consider.

This is not an answer book. It is really not even a question book, but an attempt to establish some sort of solid scientific foundation which will help to formulate the right kinds of questions. When I talk to friends with an interest in the occult, or to almost anyone under the age of twenty-five, about reincarnation or astral bodies, they just nod reassuringly. And when I persist

and demand to know how they can be so certain that these phenomena exist, they simply say that that's how things are. I suspect that they may be right and I envy their ability to take so much on trust, but I cannot function in that way. I carry the heavy handicap of ten years' training in the sciences and I feel compelled to try and find some way of reconciling scientific investigation and mystic revelation. I am beginning to appreciate that there are limits to the scientific method and that it is impossible to observe some things without substantially changing them in the process. To observe is to modify; and to describe and understand, is to alter radically. Atomic physics now recognizes that, if something cannot be measured, then the question of whether or not it exists, is meaningless. I can accept this and, where it becomes necessary, I am prepared to abandon the traditional scientific approach. I find that most of the time my line of investigation brings me in the end directly to the place where my mystic friends have been operating all along, but unlike many of them I know exactly where I am, because I can look back along the line and see how I got there.

So, for those who find it difficult to come to terms with other realities, I offer this imperfect route map that starts out in errancy and ends on the edge of an awesome new frontier. I hope that you will find, as I have, that death can be turned into a life-line.

LYALL WATSON
Bali, Indonesia; 1974

Part One

BODY

THE Romeo Error is not rare, nor is it peculiar to distraught Latin lovers. It was made by even the most celebrated of all anatomists. At the height of his career in the middle of the sixteenth century, Andreas Vesalius was dissecting the body of a Spanish nobleman when the "corpse" came back to life.[211] The injured Don made a complete recovery, but Vesalius was reported to the Court of the Inquisition and sentenced to death for his error. Not long afterwards, the Grand Inquisitor himself is said to have recovered consciousness on the table of another anatomist.[263] This time the error came to light too late.

Others have been more fortunate. The Reverend Schwartz, an early oriental missionary, was roused from apparent death in Delhi by the sound of his favourite hymn. The congregation celebrating the last rites became aware of their error when a voice from the coffin joined in the chorus.[101] Nicephorus Glycas, the Greek Orthodox Bishop of Lesbos, caused comparable consternation among his devout followers. After two days lying in state in his episcopal vestments in the church at Methymni, he suddenly sat bolt upright on the Metropolitan's throne, glared at the line of mourners passing by and demanded to know what they were staring at.[293]

There are similar reports in Plato's dialogues, in Plutarch's lives and in the natural histories of Pliny the Elder, but it would be wrong to assume that the error is purely historic. In 1964, the post-mortem operation at a New York mortuary was disrupted just as the first cut was being made, when the patient leaped up and seized the surgeon by his throat. This doctor paid for the error with his life—he died of shock.

The word autopsy literally means "seeing with one's own eyes", but there seems to be such genuine difficulty in correctly diagnosing some cases of death that most countries have laws which forbid hasty funerals. The Italian poet Francesco Petrarch lay in Ferrara apparently dead for twenty hours and would have been buried on the completion of the time laid down by local law, in just four more hours, if a sudden change in temperature had not made him sit up in his bed. He complained of the draught, reprimanded his attendants and went on to live another thirty years and write some of his finest sonnets.[198] Some countries even have waiting rooms in their mortuaries. In Munich there is an enormous Gothic building where the dead once lay in long rows all connected by cords leading to bells in the central office of the caretaker. It seems that his sleep was disturbed sufficiently often to make the arrangement worthwhile.

There is of course a limit to the amount of time a corpse can be left lying around and so various tests have been devised in an attempt to avoid errors. One of the oldest of these is the application of a lighted taper to parts of the body on the valid assumption that skin no longer blisters once circulation has ceased. This worked for Luigi Vittori, a carbineer in the service of Pope Pius IX, who was certified dead of asthma in a Roman hospital until a second, more sceptical, doctor held a flame to his face. Luigi eventually shuddered back to consciousness and resumed his duties at the Vatican, but for the rest of his life he carried the *memento mori* of third-degree burns on his nose.[198]

Dr. Icard of Marseilles has produced a more modern variation of this test. He injects a dilute solution of fluorescine which produces a temporary green cast to the cornea of the eye in living subjects, but has no effect after death.[295] In the United States atropine, which normally causes dilation of the pupil of the eye, has been used as a similar critical test in cases where the doctor was in doubt. In Britain, coroners are experimenting with a simple portable cardiograph that will register even faint electrical activity in the heart.[297] When the new instrument at Sheffield mortuary was used for the first time on 26 February

1970, it detected signs of life in a twenty-three-year-old girl certified dead following an overdose of drugs.[208]

There are some tests which work well, but the problem with all of them is that a negative result means nothing. And in Britain alone over six hundred thousand people die each year without any kind of test at all. A strong possibility exists that even in countries where death has to be certified and registered, like Britain, a large number of people are being buried before their time. One estimate suggests that the figure may be as high as two thousand seven hundred each year in England and Wales, but it is worth noting that this survey was made in the late nineteenth century when concern about premature burial was at its height.[209]

The English novelist Wilkie Collins left a note by his bedside each night specifying certain precautions that should be taken before it be assumed that he was dead. Hans Christian Andersen never went out without a similar note in his pocket. Colonel Edward Vollum of the United States Army Medical Corps proposed a plan whereby anyone being buried without being embalmed should have a bottle of chloroform within easy reach.[77] Count Karnicé-Karnicki, Chamberlain to Czar Alexander III, invented a more humane device consisting of a tube leading from the coffin to a box on the surface which could not be opened from the outside, but would spring open at the first sign of life from within, allowing air to enter, raising a pole with a flag on the end and setting off a bell and a flashing light to summon assistance. The Count's plan was to produce these machines for sale to cemeteries who would rent them out to the recently interred for a cautionary period of fourteen days.[101]

This kind of concern seems to have arisen largely because of the activities of a group of professional body-snatchers known as the Resurrection Men. In Britain, these entrepreneurs dug up and sold the recently dead to the Barber Surgeons Company which received an official grant of only four corpses a year, but paid top prices for additional subjects and asked no embarrassing questions. The trade became public in 1824 when John Macintyre, who was certified dead and properly buried in his local churchyard, woke up on the dissecting table at a London

medical school when the demonstrator's knife pierced his chest.[77] Following an inquiry, guards began to be put on duty at cemeteries to ensure that the newly buried stayed there—and it was not long before several other premature burials were discovered.

In 1856 the grave of a man was opened after knocking sounds were heard, but it took so long for permission to be obtained from the priest and the police that by the time the rescuers reached the coffin, the inhabitant was really dead. The fact that he had been buried alive was obvious from the wounds the man had inflicted upon himself by biting his shoulders and arms.[107] In 1893 a young woman who had apparently died in late pregnancy, was exhumed following a report of noises from the grave. The authorities found her torn and bleeding following a frantic struggle to free herself, a battle which resulted in the birth of her baby, but which ended in the death by suffocation of them both.

In times of war and plague, when thousands of bodies had to be disposed of as quickly as possible, many were buried alive. When medical science was rudimentary or non-existent, mistakes must often have been made. But today, with people being certified by attendant doctors and prepared for disposal by professional undertakers, errors would seem to be impossible. And yet, on 11 December 1963, thirty-five-year-old Elsie Waring collapsed at her home in London and was taken to the Willesden General Hospital where three doctors certified her as dead on arrival. Ten hours later, she gasped and began to breathe again while being lifted into her coffin at Kilburn Public Mortuary.[294]

The Romeo Error is still being made—and it will continue to be made because the differences between life and death are blurred by our current inability to define either state with any clarity.

In this first section I will examine our ideas about life and death and try to put them into some kind of biological perspective.

Chapter One

LIFE and the origin of death

When a child first opens its eyes it sees nothing. The womb is dark, because what little light filters through the mother's distended skin, is soon dispersed by the amniotic fluid. During the last four months of gestation, the wrinkled face of the baby squints into this liquid gloom, seeing nothing and hearing very little, but beginning to explore the world with its hands. The fingers are fully formed, each with a perfect miniature nail, and they flex and bend, grasping at each other and the walls of the womb. One of the first things they find is hair, long and soft and silky, growing from its own arms and legs. In this lanugo they luxuriate, twining and stroking, practising the grip which once held them firmly to their mother's hairy breast as she fled through the tops of the trees from terrors we can only guess at. Then, near the end of pregnancy, the lanugo disappears without trace and its place is taken by the short soft golden down of vellus with which each human child is born.

Our time in the uterus is not given over entirely to growth. Death is there as well. Embryonic cells divide and grow and group themselves into meaningful arrays, but some of these are transitory, just organic ghosts flickering through the memories of evolution in search of the proper pattern. Gills and tails and body fur no longer serve a purpose, so they have to be unassembled. Parts of us begin to die long before we are born. Cells and tissues replace one another in a sustained dynamic process, with life and death so mutually dependent that they are almost indistinguishable. Death is an essential part of even the

newest life, and yet, death has become so unspeakable that it is not even mentioned in the index of any textbook on basic biology.

Ask most biologists to define death and you learn that it is "an absence of life". Ask for a definition of life and you get almost as many answers as there are practising biologists, but despite the fact that life arose from non-living matter, very few of the descriptions will be framed in the negative terms that are applied to death. Which is strange, because in the cosmos death is the state of equilibrium, the natural condition to which all life tends if nothing from outside is added to maintain it in action. The Greek and German words for life express this quality more precisely than the English by giving the sense of "remaining" or "persisting". Life has been well described as the adhesive property and logically it is the state that deserves to be defined negatively as "an absence of death".

We have a bias towards life. In an evolutionary sense, this prejudice is good and useful, it has survival value, but it does not help us to understand the intricate relationship which exists between life and death. It makes death very difficult to examine objectively. One psychologist describes his research into death as ending all too often with the realization that "I have simply observed my mind as it scurries about in the dark."[141]

Perhaps the best way to come to scientific grips with death is to take biology, still protesting that it is the science of life, back to consider life at its most simple. To look at life when it is still in doubt, when there is little to distinguish living from non-living.

Molecular biologists today have access to more and more sophisticated electronic aids to vision and, with each increase in magnification, it becomes clear that there is in principle no ultimate gap between living and dead matter. As the structure and behaviour of molecules comes to light, it seems that living organisms can best be described as non-living matter that has become organized in a special and different way. Studies are now beginning to focus on this difference and they show that it is largely a matter of degree. All possible stages of organization intermediate between what we consider "dead" and what we define as "living", are present in nature and it is impossible to

draw a line anywhere along the spectrum and say "life begins here".

The material in which life becomes organized, is organic matter. It is composed of carbon compounds. Of all the hundred odd elements now known, carbon is unique in that it can combine with itself to form very large conglomerations of thousands of atoms, called macromolecules. The most common of these are proteins which make up about half the dry weight of any living organism. Man has over one hundred thousand different kinds of protein in his body, but he is nothing special in this respect. Proteins form the stuff of all life. In organisms as different as cabbages and kings, almost identical proteins get together to control the speed of chemical reactions and to act as controllers of all growth processes; and these proteins are all formed under the watchful eye of one small group of related macromolecules that carry the plan of organization from one generation to another. Living things, no matter how much they may differ from each other in appearance and behaviour, are identical at a fundamental level. They came to life in the same way and they depend on the same chemical processes for maintaining an independent existence and for reproducing themselves.

There is also a limiting factor which is common to all life. To carry out these fundamental activities, a large number of giant molecules are necessary and all of these have to be accommodated within the same container. So a certain minimum space is required and this lower limit to the physical size of any independent living organism has been calculated to be about five thousand Angstrom units in diameter.[48] Which means that twenty thousand such structures could fit side by side across the width of a fingernail. This limitation suggests that we could begin to define death as anything smaller than five thousand Angstrom, but hovering uncertainly in the lower regions of the death-life continuum are a number of entities that range from half down to one-fiftieth of this critical size and yet still show many of the characteristics of life. These awkward non-conformists are the viruses and they hold some vital clues to a realistic assessment of death.

Viruses reproduce themselves, but to do so they have to make good their chemical deficits by invading the cell of a more conventional organism. Here they take over the biological assembly lines and divert them from making the normal substances of the host cell to producing new viruses. It has been argued that this dependence on other life means that no virus can be considered as a living organism in its own right, but with the exception of green plants, there are very few living things that do not feed directly on other forms of life. The viruses cannot be disqualified on this count.

In being able to reproduce at all, under any circumstances, viruses are more lifelike than the red cells in our blood. A pinprick drop of blood swarms with five million cells that contain haemoglobin and convey oxygen from the lungs to the rest of the body, but during their development they have lost their nuclei and are therefore completely incapable of reproduction. This does not mean that they are dead. Mules and sterile men are not condemned to death simply because they cannot reproduce. There are obviously degrees of deadness and the red blood cells are considered to be more alive than dead because of their complex internal integration. They have become organized in that vital "special and different way".

In 1935 Wendell Stanley at the Rockefeller Institute in New York discovered that it was possible to concentrate the juice from infected tobacco plants and to isolate the tobacco mosaic virus in a crystalline form.[128] The crystals of this particular virus are long and thin and apparently indistinguishable from the crystals of purely chemical compounds. They can be crumpled and powdered and kept in a glass tube like any other inert organic substance, such as powdered sugar. Both virus and sugar crystals can be made to grow again. If the virus powder is inoculated into growing tobacco plants, it goes immediately into solution and starts to prey upon the cells of the leaves and to produce more virus. The sugar powder needs a different kind of treatment. A concentrated solution of sugar has to be made and to be kept at a special temperature. Then this solution has either to be seeded with a sugar crystal or left long enough to itself for molecules to accumulate into a structure of the right

shape. This structure then increases in size and splits in certain ways until two identical crystals are formed. In both cases reproduction has taken place, but there is a critical difference in the way that this has been organized.

Most organic substances do not readily form crystals, but will do so in a pure and highly concentrated solution. A crystal can usually be formed only from identical molecules (hence the need for purity) which become attracted to each other and arrange themselves to form a regular and repetitive pattern. This is how both virus and sugar crystals were formed in the first place. Once each has been powdered and destroyed, the sugar can only be brought back to the crystal state by diluting it and then applying heat to bring it back to the critical concentration. When the process is complete, there is no more than the original amount of sugar, but when the virus powder is diluted in a host cell, it starts off a biochemical reaction which not only releases heat, but results in an enormous multiplication of virus material.

The sugar is involved in a closed thermostatic chemical reaction. The virus induces an open thermodynamic process in which there is an exchange of matter with the surroundings. This is the vital difference between living organisms and non-living organic matter. Both obey the same fundamental physico-chemical laws, but they differ widely in the way that these apply to them. Living matter is organized in such a way that it draws on energy in its environment to maintain its order. Non-living matter simply becomes disorganized.

If the subject of crystals seems remote from biology and our concern with life and death, just look at the back of your hand. The surface skin cells are all translucent crystals attached to one another by thin films of oil. These cells are hard and filled with keratin and by most definitions are dead. Very soon they will be sloughed off and disappear along with the other five hundred thousand million cells we lose each day, but while they last, they lie over the surface of the whole body like a plastic suit of armour designed specifically to protect the delicate tissues beneath. Truly living cells cannot survive exposure to the air, but the protective crystal cells are not killed by being forced to the surface by replacement from below. They commit suicide.

Long before the cells reach the outside air, they begin to produce fibrous keratin until the whole cell body is filled with the horny substance. Technically these cells are dead. They certainly cannot reproduce themselves, but they equally certainly consist of matter which is highly organized and which is arranged at a special place at a particular time.

Are the skin cells dead? If so, our bodies are literally covered with death. There is not a living cell in sight and yet our friends, who see nothing but death, persist in regarding us as alive. Let us give them the benefit of the doubt, because it is becoming clear that there are varying degrees of death. It seems that the most realistic classification of living matter will turn out to be one that relies on a combination of both life and death. The one thing that the strange behaviour of viruses demonstrates beyond a shadow of a doubt is that the old polar definitions are totally inadequate.

Life depends on death. We owe our lives not only to the cells that erect a barrier between us and the outside world, but also to armies of others that regularly lay down their lives in internal battles dedicated to the greater glory of the organism.

For every thousand red cells in our blood, there is a slightly larger more transparent one with a nucleus. This white cell has the power of amoeboid movement and tends to creep with others of its kind along the walls of the blood vessels instead of being bowled along down the middle in the plasmic tide that carries the red cells to their appointed places. White cells use the blood stream only as a means of transport and ooze out through the walls of capillary vessels to any point in the surrounding tissues where they may be needed. White cells are ready for instant action. They congregate rapidly at a site of infection or injury and advance on intruding bacteria, taking them captive by flowing completely around the invaders. As many as twenty bacteria can be imprisoned and eventually digested within a single cell, but the battle is by no means one-sided. The corpuscles often die from the effects of bacterial toxins and the pus which appears at the site of the conflict is simply an accumulation of dead white blood cells. Our bodies obviously need these omnivorous warriors, who cope not only with the constant threat

of bacterial invasion, but also absorb particles of pollution in the lungs, dissolve splinters and generally attack anything foreign to the system. To have too few white cells would be disastrous, but the democracy of the organism can be equally seriously threatened by an army that becomes too large. An over-production of white cells produces leukaemia.

Under normal circumstances a balance is maintained. The body avoids a population explosion that would be harmful by making new cells at the same rate as the old ones die. It does not have to wait until they die, because their deaths have been largely predetermined. Each day some of us dies so that the rest of us might live. The deaths which do occur are clearly not due to chance or to a random competitive process involving only the survival of the fittest. They are directed towards a particular end. Death is programmed into life, and living organisms cannot survive unless the death of certain of their parts occurs on schedule.

Two embryologists in the United States demonstrated this fact very neatly in a recent experiment with developing chicks.[235] They showed that the wings of fowl could never be functional unless specific mesodermal cells in the wing bud of the embryo died at an appropriate time and allowed others to develop into flight muscles. The death of these cells is an intrinsic part of the growth programme in all flying birds. A similar process of planned assassination takes place in the development of the frog. Tadpoles live in water where they feed on aquatic plants and move about by undulations of a long muscular tail. As they develop, their diet changes to include slugs and worms and gradually they move closer and closer to the shore where there is a wider variety of insect food. Legs appear and, at about fourteen weeks of age, the young frogs make their way out on to dry land where their tails act only as an impediment. At this point of development, the tail gradually disappears—it is digested from within by special mobile cells that behave exactly like the white blood cells that attack bacteria, except that they are cannibalistic. Life proceeds by killing itself.

These are examples of death reinforcing life within a single organism. A much more familiar process is the way in which

death maintains a necessary balance by preventing total population growth from getting out of hand. If death did not exist, the fastest breeders would take over the world. One invisible little bacterium could on its own produce a mass equal to the weight of a man in a few hours—and every ounce of soil contains a hundred million such potential patriarchs. In less than two days, the entire surface of the earth would be covered in great smelly dunes of prettily coloured bacteria. Left similarly unhindered, a protozoan could achieve the same end in forty days; a house fly would need four years; a rat eight years; a clover plant eleven years; and it would take almost a century for us to be overwhelmed by elephants.[159]

Fortunately, the growth of population in many species is self-limiting. In the classic case of botanical succession, a pioneer plant that thrives on soil with a low nitrogen content, moves into an open area. Here it grows abundantly and as it does so, it adds nitrogen to the soil and by virtue of its own success, destroys the very conditions that made that success possible. For species without this kind of self-control, there are predators waiting to take their toll.

Life feeds on life and this produces a cyclical effect in which the atoms that make up a particular piece of living matter may find themselves going on endlessly from one living form to another. Green plants produce life from soil, water and the energy of the sun. They may draw their raw materials directly from non-living matter, but then the plant is eaten by a caterpillar, who gets picked off by a passing sparrow, which falls prey to a hawk, that dies of frostbite and is consumed by scavenging beetles . . . and so on. Once caught up in the network of living matter, atoms tend to find themselves trapped there by a sort of organic momentum that carries them through countless life cycles that may last for hundreds of years. It almost seems as though life is capable of adding some mystical property to non-living matter simply by coming into contact with it and that, once incorporated into a living cell, matter is changed in a way that makes it more likely to be incorporated once again. We shall see later that it is even becoming possible to measure this change.

Biophysicist Joseph Hoffman calls this continuing process the "atomic vortex of life" and points out that there are few foods we eat which have not recently been part of another living thing; and that the growth of plants is enhanced by the presence of former living material, even when (like wood ash) this has been incinerated since it was last alive.[120] The change induced by life in matter is clearly not simply a chemical one.

Once again we are confronted with the notion of degrees of death. The remains of living organisms still contain traces of life and should perhaps be considered as part of life. Every single piece of organic material now found on earth's surface was formed by life and many fragments seem to carry traces of this experience. By all traditional definitions, humus is dead and yet it is considerably different from the rocks on which it lies. Hoffman suggests that "living things know more than they can tell" and that a tree puts out seeds "in the faith" that there will be more there to receive them than just barren rock. In the light of the connections that we now know exist between isolated plants and other living matter, it is difficult not to agree with him that the net of life should be cast wide enough even to include everything recently "dead".

At the interface between organic and inorganic matter are the highly versatile bacteria. Unlike the anomolous viruses these organisms really do form a bridge between living and non-living material. Bacteria are unquestionably alive and although they thrive best in a warm moist environment, they occur in a wide range of habitats. Many can exist without oxygen, some can live in water almost hot enough to boil and most survive indefinitely at temperatures well below freezing. A few are photosynthetic and receive their energy like plants direct from sunlight, but the rest require organic food. To get this they foster the process of decay in which complex organic compounds are broken down or mineralized into more simple inorganic chemicals. The bacterium takes what it needs and the rest is released into nature. Many of these products do not occur spontaneously and if bacteria did not make them available, they would be locked away for ever in forms inaccessible to other living things and all life would soon disappear.

Bacteria themselves seem to be virtually immortal. After growing to an optimal size, which may take only twenty minutes, they simply divide and then the two new bacteria feed and grow and then divide again. Under ideal conditions in which no bacteria are killed by viruses or white blood cells, none would ever die. For a bacterium there is no death from old age and no corpse except when it is actively destroyed. So for the most simple collections of living matter to be enclosed within a single cell, death is a meaningless construct. Evolution seems to have moved from totally dead inorganic matter to everlasting self-replicating life in one swift step. The complication of a flexible life–death relationship appears to have been a refinement that was added later for some other reason.

Most simple organisms composed of a single cell reproduce by the bacterial method of binary fission in which a parent cell divides into two daughter cells, each containing roughly half the original material. If the cell has a nucleus, then this divides first so that each daughter gets an equal share of the organism's hereditary material. Where there are unpaired structures in a cell, such as the single gullet in the small slipper-shaped *Paramecium*, one of the daughters gets this and the other has to grow its own from instructions contained in its share of the nucleus. Parasitic protozoans like *Plasmodium* that live in the body fluids of their hosts, are protected from the rigours of the external environment and surrounded on all sides by an abundance of food that they simply have to absorb through their cell walls. Under these ideal conditions, reproduction can take place very rapidly. Finding binary fission too slow, these organisms resort to multiple fission in which the nucleus splits rapidly into a large number of parts, each of which becomes surrounded by a tiny piece of protoplasm and becomes a separate cell. It is the shock of this sudden multiplication and the simultaneous emergence of billions of tiny parasites in our blood stream that produces the fever of malaria. By dividing their assets in these ways, both *Paramecium* and *Plasmodium* enjoy the same kind of deathless continuity as the bacteria.

Higher up the ladder of evolution there are many other immortals. One little coelenterate bears the name of the mythical

monster *Hydra* because of its ability to grow a new head or to bud off entirely new individuals from the side of its body. The flatworm *Planaria* produces two or more complete worms when cut up into pieces in a way that would certainly prove fatal to other species. An arm separated from a starfish soon regrows the four missing limbs and goes straight back into business on its own. Reproduction of this kind is useful to any organism when rapid multiplication is necessary or advantageous, but there is a catch. Every daughter cell and every new bud produces an offspring exactly like its parent. This is fine as long as conditions do not change, but in our dynamic system the advantages go to organisms that can themselves change to keep pace with changes in their surroundings.

Life found the answer to this dilemma in sex. Even while most bacteria were occupied in fission, a few began to experiment with a direct exchange of hereditary material between intact individuals. In 1947, Joshua Lederberg of Columbia University showed that the common colon bacillus *Escherichia coli*, which each of us carries by the million, sometimes occurs in two forms that have elementary male and female characteristics.[109] At times an elongated cell from the male strain approaches close to a cell of the plump more rounded female type and extends a short tube which pushes through the cell wall of the female and injects genetic material. This process of transfer takes about two hours, which means that mating in bacteria can last six times as long as a non-sexual generation. It sounds like a pleasant way to prolong life.

The value of the transfer is that cells produced later by the female bacterium have a mixture of male and female characteristics. For the first time in evolution, offspring have two parents and differ from both of them. The adaptive advantages of this development are considerable and ever since that time, sexual reproduction has played an increasingly important part in the lives of all organisms. For a while it existed alongside the asexual techniques of fission and budding in an alternation of generations, but eventually the advantages of sexual reproduction outweighed those of all other methods and organisms evolved which were totally sexual.

This meant that they could either be male or female and could only multiply by giving small parts of their bodies to a union that produced new individuals. For the first time organisms really were individuals with a finite life cycle. They were born and grew and reached maturity and reproduced, but then (unlike the bacteria which just divided and started again) they grew old and died. The price we have had to pay for sex is death.

As some compensation for loss of immortality, organisms gained individuality. From being merely transitory phases in an endless process, they became discrete entities with their own unique characters. Whereas it was only possible to say of bacteria that a process had been disrupted, the same event in the insect world can be described by saying that a grasshopper has died. With the existence of individuals, it becomes possible to move from the generalization that death occurred, to a particular description of exactly who is dead; but a new problem looms. We decided earlier that an organism was still alive despite the fact that some of its constituent cells were dead. We even suggested that the dead cells might validly be considered alive because they still played a role in the survival of the organism as a whole. When individuals belong to a closely knit society, they may have to be considered in exactly the same way.

The zoologist Claiborne Jones points out that it is as difficult to find a satisfactory definition of an individual as it is of a species, and he suggests that the honeybee for instance is not an organism at all, but a totally artificial human concept.[131] It is the beehive that exists as an organism. If this is true, then when a worker bee is killed, has it died or is it just one disposable part of the hive that has been lost? There are ample grounds for considering the beehive and the termite nest as organisms in their own right. Individual worker bees or termites are sterile and no more capable of reproducing themselves than red blood cells. In fact they fulfil identical roles as fetchers and carriers and have as little chance of survival on their own as an isolated blood cell. Who then has the individual identity, the bee or the hive? If the hive is the organism, then does its life depend on the number of worker components that survive? How many bees

can one remove before the hive can be said to have died? It seems likely that the answer to this dilemma is the same as that which applies to cells in a body—namely that life and death exist side by side and that a definition of either, if it is to be at all meaningful, will have to include both.

The possibility of social organisms and group identities, raises another question. Assume that some disruptive outside force breaks up the hive without killing a single bee, but simply spreads them out over the surrounding countryside. The hive has disappeared, but is the organism dead? If not, then what do you say when the scattered bees are taken in and become component parts of other hives? If a wolf is killed and eaten by other wolves, we say that it has died, but is this right? The dilemma grows. Where does life reside when its parts are rearranged? This is not just a philosophical problem. With the advent of transplant surgery, it becomes one of major moral and legal concern.

Marine sponges consist of masses of cells organized into a community which functions as a whole and is considered by most zoologists to be a single organism. But if you cut up a sponge and squeeze the pieces through silk cloth so that every cell has been separated from its neighbour, this disorganized gruel soon gets together and reorganizes itself into a complete sponge. A very clever experiment along these lines has been done with the red encrusting sponge *Microciona prolifera* and the yellow sulphur sponge *Cliona celata*.[120] A specimen of each was finely sieved and the solutions were thoroughly mixed together. At the end of twenty-four hours, the red and yellow cells had reorganized themselves and become combined back into their original sponge forms. Two distinct living organisms existed at the beginning of the experiment, but who was alive and who was dead in the blended soup? The cells were all alive, but at what stage can we claim individual life for each of the organisms? And what are we to make of the strange fact that a few red cells turned up quite happily built into the yellow sponge?

There is room for argument that sponges are colonies rather than discrete organisms, but Theodore Hauschka has done

some extraordinary work with an undoubted organism—a mouse.[120] He took embryos from a mouse on the thirteenth day of gestation and ground them up small enough to pass through a fine hypodermic needle. This solution he inoculated into the body cavities of virgin female mice of the same strain. After five weeks, all these animals were found to have large co-ordinated masses of bone and tissue growing in their peritoneal cavities. These masses were identical to those of embryonic mice about one week old. The separate cells were obviously still capable of getting together and growing as if intent on forming complete animals, but which animals? Mice it seems, but which mice? The same ones that would have been formed in the original uterus? If not, what has become of those mice? Are they dead?

A clue to the whole problem lies in the behaviour of individual cells.

Many different types of cell will continue to multiply freely outside the body if given the proper conditions. This technique of tissue culture requires the right temperature and a complex nutrient solution that may contain as many as a hundred different ingredients. Most experts have their own little tricks for getting a culture started. Cells from bone marrow or the lining of the intestine are already multiplying freely in the body, so these stand a better chance of getting a culture going outside. Embryonic cells are also likely candidates because they have already begun to grow rapidly and seem to carry some of this momentum over into new situations.

In recent years isolated tissues have been cultivated from cells taken from ducks, rabbits, cows, sheep, horses, mice, rats, guinea pigs, monkeys and humans. If the cells come from an embryo, they will often group themselves into an appropriate structure such as a muscle or a bone of the right size and shape for that species. Isolated plant cells can even be coaxed into producing whole new organisms. A tissue culture started from a single cell taken from the growing shoot of a tobacco plant, has developed in the laboratory into an entire adult plant complete with roots, leaves and flowers. Every cell in any organism has this potential. In each nucleus lie all the necessary instructions

for producing a fully functional combination of cells in the shape of an individual of that species. No animal has yet been produced in this way, but theoretically there is no reason why it should not be possible to culture hundreds of new individuals, each identical to the original donor.

In practice there is a snag. It is known as the Hayflick limit. L. Hayflick is a tissue-culture expert working at the Wistar Institute in Philadelphia, where he has discovered that a culture started from human embryonic cells will only continue to multiply for about fifty generations.[30] No matter how good the conditions may be, the culture cannot be persuaded to go any further—it just dies. Hayflick suggests that this might be a natural limit and that even in the body, no cell would be able to do more than this. If we go back to the starting point of the fertilized egg, we can add perhaps another twenty generations and this total of seventy multiplications would result in sufficient numbers to replace every cell in the body twenty million times. It is true that this is more than enough for any man's life span, but at the moment there is no evidence that the Hayflick limit applies to cells in their proper place. It is clear however that cells in a culture lose some vital factor after a period of growth in isolation. We will see later that this factor has now been identified, and I suspect that with improvements in culture techniques it will be possible to retain or replace this factor and exceed the Hayflick limit.

The most fascinating part of this tissue research is the discovery of what happens to an isolated culture when it nears the present limit. Cells that start off as clearly recognizable human body cells, begin to lose their unique identity. After being forced to multiply again and again, without being allowed to produce an organ or structure characteristic of their kind, the cells seem to "forget" who they are supposed to be. The Hayflick limit is different for every species, but the same thing happens to the cells from any organism as they near this point of collapse—they seem to "lose their memories". After long culturing all cells, regardless of their origins, come to look the same. Highly distinctive units from the salivary glands of fruit flies, from the ovaries of sheep, from the inner ears of mice or from the petals

of a flower, all slide into anonymity. They become amorphous squamous cells with no particular shape and no sign of their unique origins or destinies. They become vegetating idiots.

These anonymous isolated cells still carry their genetic blueprints, they still feed and grow, their cytoplasm throbs and simmers and they divide on schedule, but they have become self-duplicating automatons with no special plan. They have lost their identity and purpose and have become totally incapable of fulfilling the potential which still lies encoded in their chromosomes. The plans are intact, they contain all the instructions for life, but the cells have forgotten how to read.

These simpleton cells seem to have reverted to a state something like that of the very first living cells ever formed. They become once again a sort of lowest common denominator, an unspecialized building block capable of going in any direction; but in the exhausted tissue culture they go nowhere, they just die. There is only one way to save these cells, and that is to give them new instructions. If exiled human cells are fed on a mixture containing horse serum, they become more horse-like and go off with renewed energy in this direction. Or if some mutation takes place in one of the cells, a new line with its own momentum takes command and the culture starts to grow beyond the old Hayflick limit. This is what happens when a cell becomes cancerous. It undergoes a mutation that gives it instructions unlike those of its parent cells and it is no longer subject to their restraint. The tissue takes on a new identity with its own limits and these in turn can be surpassed with further changes and mutations.

Another way of reviving a flagging culture is to put it back into contact with the body of the original donor. If the cells have mutated in the meantime, they sometimes produce malignant growths or cancers, but if their genetic material remains unaltered, they will often begin functioning once again with all the old vigour. They will work once more towards a particular goal, which depends on their precise location. Cells from the orbital area of a frog embryo can be removed and placed somewhere in its stomach region, but there they produce new gut lining and not internal eyes. There is a co-ordinating system

which ensures that cells in a particular area, although each is potentially capable of doing anything, do what is required of them there. If this were not so, then a group of cells sparked into activity in any area might produce something totally inappropriate. It would be most alarming if, after a minor cut or abrasion on your elbow, cells started to regenerate in an undisciplined way and you grew a baby there. This is not as outlandish as it sounds because there are species, such as the freshwater *Hydra*, which do exactly this. The immortals retain a cellular freedom which allows each part to duplicate the whole, but more mortal species are governed in a way which makes the parts subordinate to the general plan.

The co-ordinating centres that enforce genetic instructions are not confined to the brain or the endocrine glands; they have never been isolated in any one part of the body, but seem to be present everywhere. In the case of the tobacco cell that grew into a whole new properly co-ordinated plant, the governor must have been present in the single isolated cell. This could be true of all single cells and we may, with the proper technology, one day be able to grow any species from any one of its smallest parts. Right now we can only produce small tissues from the isolated body cells of animals, but we have made one vital and far-reaching discovery. The fact that isolated cells eventually lose their biological identity, that they lose touch with life, gives us our first real insight into the nature of life and death.

We have seen that the two states are almost indistinguishable, that they exist together in varying proportions along a sliding scale with no fixed points. We have characterized life as a state of organization and found that patently dead cells often show the same properties. We have eliminated simple self-reproduction as a useful criterion. We have outlined some of the difficulties inherent in trying to decide where life ends and have suggested that it might still be found in some form even in matter that we normally consider to be dead. Now, with the knowledge that cells left too long on their own change from directed living units into disorganized idiots, we have the germ of theory that seems to fit all the facts.

The Romeo Error is a confusion of life with death and is made

so often simply because there is no absolute difference between the two. They are manifestations of the same biological process and differ only in degree. There is however a third state which is qualitatively distinct from both life and death. This is a state of anonymity of the kind that becomes apparent in cultured cells near the Hayflick limit. These cells are not alive in the normal sense, because they lack the identity of the species to which they once belonged; but they are not dead either, because they continue to show many lifelike activities. They differ from live cells in the blood and dead cells on the skin in that they lack the organization characteristic of their species. This absence of a dynamic pattern is the predominant feature of the third state which cannot be called either life or death, but is a real and recognizable condition in its own right and needs a name. I suggest that for the time being we call it "goth".

Apart from its application as a proper noun to an ancient Teutonic race, "goth" is meaningless in all major languages and is a word that can conveniently keep the same form for singular, plural, adjective, verb and all tenses.

So there are three states of matter—life, death and goth—but in biological terms it becomes realistic to deal with only two. Matter is either alive or it is goth. The distinction between the two is based on the presence or absence of a co-ordinating pattern or an organizer. Life can be said to exist as long as the most feeble remnant of this vortex persists in matter. When it finally disappears, in time or with isolation, then life is replaced by goth. If the matter itself should become dissipated, as a body would if it were caught in the middle of a thermonuclear explosion, then life as we know it would cease, but goth would not begin until the organizing field had also been destroyed.

Some kinds of goth are identical to the condition of total biological breakdown that has been called "absolute death". I like this term and find that it can be meaningfully applied for instance to a body that has been cremated, but it does not encompass those "zombie-like" cell conditions that fall within the definition of goth. The point that we usually call death, has been more precisely defined as "clinical death" and this too can be a useful concept, but it is such a flexible one that it seems

more like an attenuation of the life force than a biological condition in its own right.

Dead matter like a hair or claw, which serves an ordered function in a living organism, is alive. There might even be a case for including some magnets and crystals in this category. Dead matter, such as fossil bones or spun cotton, which show none of the order of rhythm of life, are goth. An organism can be stripped down to its cellular components and still retain life, but when these isolated units lose their unique identities, then the organization of life gives way to the disorganization of goth. The states of life and goth do overlap to some extent and lie along a continuum which ranges from the complexity of intelligence to the comparative simplicity of an independent molecule. Death is nothing more than a vernier which we slide along this scale in accordance with our current beliefs or the state of our technology. Death, as many philosophers have long suspected, is a state of mind.

I am well aware that this notion is largely conjectural and owes more to extrapolation than to experimentation, but as a biologist I find myself faced with overwhelming contradictions in all the existing explanations of life and death. I dislike coining new words and new concepts just for the sake of doing so, but there is such a large gap between established theory and observable fact, that some kind of new construct seems necessary and justified in this case.

In my search for corroboration, I have been forced to look beyond the usual sources for clues that could help to put the problem back into evolutionary perspective. I have collected loose ends and odd threads from a variety of strange places and make no apology for their origins, because I intend in the chapters which follow to demonstrate that these can be woven together in a scientific way into a coherent pattern that begins to make some sense of the enigma of death.

Chapter Two

DEATH regarded as a disease

An adult human body contains roughly sixty million million cells and every twenty-four hours it loses enough of them to fill a soup plate.

Look closely at the flakes that shower constantly from the skin and you see exquisitely wrought crystalline polygons whose surfaces form translucent pyramids of keratin. Look at one of the sixty hairs you shed each day and see over a thousand cells arranged like circular shingles around a central fibrous core. Scrape a thin sliver from a fingernail and you lose another ten thousand cells, stratified and compressed into a hard horny substance. On the outside of the body every touch, every breath of wind takes its toll, and on the inside conditions are just as rigorous. Every day the entire lining of the mouth is washed down into the stomach and digested, and seventy thousand million cells are scraped off the walls of the intestine by passing food. The rest of the daily quota are destroyed in chemical disasters as love, hate, anger and worry all wear the body down.

Laid end to end, the day's total harvest would span the Atlantic, but in the average young adult there is no net loss or gain of cells because the body makes as many as it loses. A child is born with just two million million cells and, as it grows, these multiply in numbers about thirty times to bring the body weight up to the adult level. From maturity onwards there is a constant drain. After the age of puberty, brain cells are never replaced and each year after thirty, we lose an average of one per cent of our neural network. The loss is progressive and continues with

increasing age until a point is reached where the balance of life tips rapidly and disorder and disorganization become more pronounced.

Finally, a point is reached when we say that a particular organism has died, but how do we know exactly when this happens? Are there any criteria we can use to demonstrate that something special has taken place? Can we be sure?

The United Nations department of Vital Statistics defines death as "the permanent cessation of all vital functions".[279] Most authorities agree with this comprehensive definition, but there is considerable disagreement over how one should recognize the functions and what constitutes cessation, or clinical death.

A British Consumer Publication on *What To Do When Someone Dies* suggests that the first thing to do is to check for breathing by holding a mirror to the mouth to see if it mists over, but even the earliest medical writings recognized this test as unreliable.[3] Advanced hatha-yoga students learn a technique called *khechari mudra* in which the adept thrusts the tip of his tongue into the nasal orifice at the back of the palate and sits with his mouth closed for hours, apparently unable to draw breath of any kind.[290] Tests on such a practitioner kept in an airtight metal box in India, showed that he was able to reduce his oxygen consumption and carbon dioxide elimination to a minute level and survive under conditions which would certainly have been lethal for any normal person.[2] Other tests on Zen monks in Japan and on students of transcendental meditation in the United States show that they all produce an immediate decrease of about twenty per cent in oxygen consumption the moment meditation begins.[282] Presumably with practice these figures can be improved. Most of the textbooks on suspended animation refer to a certain Colonel Townsend who deliberately stopped breathing for so long in front of a panel of examining doctors in London that they certified him dead and all went home. He did it again the following day.[46]

The second traditional sign of clinical death is cessation of the pulse. Here again the picture is complicated by those who have learned conscious control over normally unconscious processes.

A French cardiologist who went to India with a portable electrocardiograph found several subjects who could stop their hearts on demand.[281] Even rats can be taught by instrumental training techniques to control their heart rate.[182] In one test series seven rats actually resisted the strong automatic signals which the body sends out when something dangerous is going on, and kept their hearts stopped for so long that they died.[63] I have personally seen a skilled fakir in a New Delhi hospital, also while attached to an electrocardiograph, stop his heart altogether for twelve minutes. On this occasion, a stimulus to the vagus nerve which carries instructions from the hindbrain to the heart seemed to be produced by what the yogis call the *valsalva* technique, which involves building up increased pressure in the chest by inhaling deeply and bending sharply forwards. The fact that modern medicine has not simplified the problem of death diagnosis, is nicely demonstrated by low temperature surgical techniques in which a heart is prevented from functioning throughout an entire operation. Any nineteenth century surgeon wandering into such a theatre today, would certify the patient dead without hesitation.

Abnormally low body temperature is also said to be a sure sign of clinical death, but one of the problems with this indicator is that there is little agreement about what the "normal" level should be. In Britain it is 98·4° F, while in the United States it is 98·6° F. Europeans agree with the Americans, but they of course record it as 37° C. Our temperatures are below "normal" when we wake up and above this hypothetical average when we go to sleep. Babies have a much higher temperature and old people have a lower one, while women gain a whole degree during ovulation. After exercise, athletes can simultaneously register 41° C rectally and 34° C on the sweat-cooled skin. A cold bath may reduce temperature to 32° C and old people in cold rooms have been rescued when their temperatures had fallen as low as 24° C. Police pathologists claim that the body temperature falls by almost a degree with each hour after clinical death and they calculate the time elapsed since murder was done by the formula 10(37 — rectal temperature)/8.[70] This is said to work well up to twelve hours, but thereafter a

more subtle table based on a percentage method is brought into use.[74]

The problem with temperature as a sign of clinical death is that sudden death from lightning or from an internal injury may not result in much change for several hours, while attacks of asthma quickly bring about deathlike temperatures in living people. Other anomalous possibilities are that the temperature rises immediately after death due to cholera, tetanus and smallpox, and that all bodies generate so much heat during decomposition that they soon attain normal temperature anyway. Drug-induced suspended animation, as Friar Laurence assured Juliet when he gave her the potion, produces deep sleep in which "no warmth or breath shall testify thou liv'st". A young Swedish boy rescued from a snowdrift recovered completely from a temperature of 17° C which, according to the police formula, proves that he had been dead for twenty-five hours. Many animals survive even lower body temperatures during natural hibernation (the hedgehog stabilizes at about 6° C) and now artificial hibernation is becoming possible for humans.[248] In hypothermic surgery it is common to stop circulation for an hour by reducing the body temperature to 15° C and in Japan brain surgery is done at the hedgehog level of 6° C. In 1967, James Bedford of California had his body permanently frozen at liquid nitrogen's temperature of —196° C and since that time at least ten others have followed him into deep freeze under the auspices of cryonics societies, whose motto is "Never say die".[203] These bodies in limbo in their cold cocoons pose awesome problems for both biology and the law.

Some medico-legal experts emphasize the changes which take place in the eye at clinical death. The kindly doctor who closes the staring eyes of the corpse has become a cinema cliché, but the eyelids become equally tractable in deep sleep, apoplexy, asphyxia, drunkenness, poisoning and after certain injuries to the head. The other classic test of shining a light into the eye has equally little merit because the iris muscles, like many others in the body, remain active and will continue to contract for several hours following certified clinical death. Forensic medical experts claim that the pupil dilates at death and then partly

contracts about twenty hours later. Some credence is also given to colour changes in that it is said that all eyes become greenish-brown some time after death. This may well be true because the iris pigment, melanin, is the same in all eyes; in brown eyes it is merely nearer the surface and in blue eyes obscured by overlaying tissue. It also seems to be true that the cornea becomes dry and hazy and that ten to twelve hours following clinical death, the eyeballs become sunken and flaccid.

When blood comes to a standstill, the red cells settle under the influence of gravity, leaving behind a clear serum that shows through the skin as a pallor, but of course only in light-skinned people. All the blood also tends to sink down to fill the capillaries in the lowest parts of the body and produce a dark staining there that is invaluable to detectives, because it can show whether or not a body has been moved. These stains cannot however be used as definitive signs of death because the only way to distinguish them from pre-death bruising, which shows more blood in the surrounding tissues, is by making an incision.[70] The fact that a few hours after clinical death, the blood begins to clot, led to a belief that it was possible to test for death by making a pinprick and looking for liquid. But the blood is prevented from clotting during life by a chemical that is produced in cells lining the vessels and these continue to function slowly following death, so that even several days after clotting begins, the blood may once again become completely fluid.

Another symptom which comes and goes is rigor mortis. This is caused by muscle fibres stiffening when one of the large energy-bearing molecules in the cells changes its form. The process starts in the intestines and then progresses to the heart, the diaphragm and the muscles of the face. It is usually first noticed in the eyelid after one hour, in the jaw after three or four hours and in a rigidity of all the long muscles of the body after about twelve hours. Thirty-six hours later the muscles relax again, but this timetable can easily be confused by a number of factors. Rigor mortis can be delayed by stress or fright leaving a high concentration of adrenalin in the blood at the moment of death and it can be overcome artificially by using

force. If a limb in rigor is made to bend, the stiffness does not reappear. It can also appear earlier than usual in cases following severe exhaustion, or even instantaneously as a cadaveric spasm in cases of sudden death. This rare condition is sometimes confused with severe attacks of tetanus.

The latest advances in medical technology have stretched the definition of clinical death to allow it to cover states once considered irreversible. The Laboratory of Experimental Physiology of Resuscitation in Moscow now describes clinical death as "a state during which all external signs of life (consciousness, reflexes, respiration and cardiac activity) are absent, but the organism as a whole is not yet dead; the metabolic processes of its tissues still proceed, and under definite conditions it is possible to restore all its functions." [86] Under normal conditions an organism in this state would probably not recover, but with therapeutic intervention, resuscitation is possible at all times until the brain cortex has become irreparably damaged. After that point, it is still possible to restore activity in individual organs like the heart and lungs, but not to bring the whole organism back to independent life. Experimental work in this area suggests that, at normal temperatures, five or six minutes is the maximum period of inactivity that the brain can tolerate and still recover all its functions. So death is now being pinpointed with electroencephalographs as the moment this period has elapsed in the least stable of all tissues in the body. This would seem to be the most precise method of death determination yet devised, but the Russian workers warn that the six minute maximum is still not fixed with any degree of certainty. They say that "from a practical standpoint it is impossible to determine exactly the end of the state of clinical death for each individual organism, and one has to resort to data based on averages".

It is obvious that no symptom on its own can be taken as a sure indication of clinical death. Most authorities have long been aware of this and all stress the fact that there is only one reliable sign—and that is putrefaction. When bacteria and fungi begin to proliferate in the intestines, they produce a discolouration on the abdomen which starts as grey spots that gradually turn to

green and produce a foul smell. Not even this however is foolproof, because certain diseases of the skin produce markings exactly like these signs of final decay.

A standard text on *Post-mortem Appearances* sums up the problem by pointing out that there are three possible causes of death.[218] These are asphyxia or respiratory failure (produced by choking, strangulation, paralysis etc. . . .); syncope or circulatory failure (brought on by shock, haemorrhage, heart disease etc. . . .); and coma or nervous failure (caused by brain injury, poisons, drugs etc. . . .). In not one of the three causes are there any characteristic external signs of any real use in diagnosis.

All the latest advances in medicine and technology do not seem to have helped much. In 1890 one concerned doctor produced a paper on the problems of determining real from apparent death and listed 418 references.[87] Today the list would have to be even longer, but there is still no sign of unanimity on the subject. All our new equipment has only helped prolong individual life and make the distinction between life and death even less clear; and, despite the sophistication of our equipment, we still make mistakes. On 3 November 1967, a severely injured United States soldier was taken to the best military hospital in South Vietnam, where efforts to resuscitate him were abandoned after forty-five minutes. The doctors and the electrocardiograph and the electroencephalograph all said that he was dead, but four hours later he recovered in the mortuary and today he draws a combat pension back home in Illinois.[172] A comment made in 1821 is still very apposite: "If we are aware of what indicates life, which everyone may be supposed to know, though perhaps no one can say that he truly and clearly understands what constitutes it, we at once arrive at the discrimination of death. It is the cessation of the phenomena with which we are so familiar—the phenomena of life." [250]

It is now clearly recognized that there are degrees of death and that clinical death (the cessation of the vital functions) occurs some time before absolute death (which is marked by the breakdown of the cells producing those functions). Hair and nails continue to grow, the liver goes on making glucose and cells can be taken from the body and successfully cultured more

than seventy-two hours after clinical death. Our new state of goth does not begin until the cells have undergone sufficient chemical damage or physical isolation to separate them from their source of organization. The first organs to experience the absolute cellular death that leads inevitably to goth are always the most specialized ones like the brain and the eye. Transplant surgeons realize this and demand more and more specialized equipment to keep certain organs alive and functional for transference to other patients. Of course this equipment is only brought into action when it is obvious that the donor must die anyway, but with each technical advance and with the addition of each new life-prolonging device, more patients are being saved who would normally have died.

Clinical death has become a changeable and purely theoretical construct and we are getting closer and closer to the point where it will be possible to replace all the vital functions, even that of the brain, with artificial equipment and postpone death almost indefinitely. Then what do we make of the United Nations definition of death as "the permanent cessation of all vital functions"? Permanency begins as soon as you turn the machinery off. Death will presumably then have to be defined as "something the doctor decides".

It becomes increasingly clear that, far from being an irrevocable fact, death is much more a function of the doctor–patient relationship. Or indeed of any relationship. It begins to seem that our observations of life and death depend more on somebody's perception of somebody else than on anything that really happens. We have perhaps to stop saying things like "Poor Jud is dead" when we have only Fred's word for it. All that we can really be said is that a death occurred between Fred and Jud. When the family doctor has been called in to certify this death, then the circle of those involved has been expanded to the minimal legal limits and Jud can be buried, but the responsibility rests heavily on the doctor. This is reflected in the wording of the British Death Certificate where the doctor fills in the cause of death "to the best of his knowledge and belief". The whole question remains at this level, one of current beliefs rather than of absolute facts. It is the doctor who has to decide

and it is not an easy decision, but there is biological help on the horizon.

Life and death seem to be inseparable, but if it is true that both are distinct from the state that we have called goth, and if instruments can be produced to measure this difference, then the situation will be at least partly resolved. At the moment there are hundreds of incurable patients all over the world lingering on for months or even years in severe states of debilitation and depletion, seemingly alive simply because of mechanical or clinical intervention. I believe that organisms under these conditions, like cells in isolation, run down into anonymity and cease to exist as individuals or even as living units. Emotionally we know this to be true. One only has to see how those looking after helpless cases, despite great kindness and the best of intentions, end up treating them like machines that require tending. The response and the analogy are fair, because I believe (although it has never been measured) that the organizers of life in these goth individuals will prove to be either qualitatively different or at least attenuated to the point where they become quantitatively negligible.

As long ago as 1836, in a Manual of Medical Jurisprudence, this was said: "Individuals who are apparently destroyed in a sudden manner, by certain wounds, diseases or even decapitation, are not really dead, but are only in conditions incompatible with the persistence of life."[231] This is an elegant and vital distinction. Death is not "incompatible with the persistence of life". Our ability to bring all kinds of death back to life is limited only by the state of our technology. There are, however, conditions beyond recall—and these are the ones characteristic of goth.

One way of resolving our difficulties with death, is to regard it simply as a disease.[287] In many respects it is a temporary state, one that like a sickness, can be cured. Just as there are some diseases still beyond our control, so there are some levels of death with which we cannot yet cope. The terminology of disease becomes relevant. We can begin to speak of "attacks of death" and to distinguish between someone who is "only slightly dead" or "very seriously dead".

Looking at death in this way helps to resolve a philosophical problem posed by two psychologists in their exhaustive and stimulating look at our reactions to death.[141] They asked the question, "How long does death last?" and made it sound like a very reasonable query by adding the logical counter-question, "How long does a creature have to be alive for us to consider it alive?" The answer to the second question is, obviously, just long enough for the necessary observation to be made. If the creature should then happen to die, then this in no way invalidates the original observation that it was alive; but the same logic is never applied to death. If a creature is observed to be dead and then turns out to be alive, we assume that the original observation was in error—someone must have made a mistake.

The roots of the problem lie in our cultural, linguistic, social, scientific, medical and psychological insistence that there is a rigid linkage between death and permanency. If death, however, is merely a disease and therefore curable, then the problem no longer exists. The answer to the question, "How long does death last?" is the same as the answer to the question, "How long does cancer last?"—until the organism either recovers or succumbs. Until it changes from being dead to being alive, or to being goth.

The comparison between death and cancer is a valid one. There is an experiment involving the culture of tissue cells from mice that suggests similarities between the two states. A single cell was taken from a mouse and grown in culture until two separate lines of cells could be established from it. After a long series of multiplications, one of the lines died at the Hayflick limit and the other kept running on past it. When cells from the surviving line were inoculated into mice of the same strain as the original donor, they produced malignant tumors which killed their hosts. The cells had become cancerous. Cancer is produced by cells which, usually by mutation, have changed sufficiently to shrug off the species organizer and run riot in abnormally rapid growth. Cancer is thus a different kind of organization from that of normal cell growth and is in this way very similar to the disease we call death. Cancer is not a unitary disease like chicken-pox, it cannot be cured in the same way and

it is certainly not produced in the same way. There is no single cause of cancer, any more than there is a cause of death. Cures for cancer will be found, but they will not eliminate cancer. Cures for death are being found, but people will continue to die —and to be treated for it. Cancer and death are both conditions of life.

The one thing that makes death distinct from all other diseases and disorders is that everybody gets it. From that moment in evolution when bacteria invented reproduction, every individual has been condemned to death. It seems to be man's unique pain to be aware and afraid of this sentence; of the fact that we live and therefore must die. Other species seem to lack this self-consciousness, but they are by no means unaware of the states of death.

Eugène Marais, that enigmatic and brilliant naturalist who searched alone and so successfully for the souls of ants and apes, tells of a tame female chacma baboon whose infant had to be taken away from her for medical treatment.[174] The mother screamed almost unceasingly for three days while Marais battled to save the baby's life, but lost. When the dead young baboon was returned to the still distraught mother, she "approached the body, making the chacma sounds of endearment, and touched it twice with her hands. She then put her face close to the back of the dead infant, touching its skin with her mouth, at the same time moving her lips in the usual chacma manner. Immediately afterwards she got up, uttered a succession of cries, walked to a corner and sat down quietly in the sun, apparently taking no more interest in the body." The incident was closed.

Gilbert Manley, while observing the chimpanzee colony at London Zoo, saw one female clasp an injured infant to her breast and carry it about with her everywhere, refusing to allow the keepers to take it from her.[171] Eventually, while Manley was watching, the baby died and the mother simply put it down and never touched it again.

The death of the young animals was as evident to their mothers as it was to human bystanders, but seemed to be no cause for fear. A noticeable change had taken place and the

response in both cases was a loss of interest in the object. Smythe, in his work on canine behaviour, says, "I have frequently seen a dog pass over the dead body of another dog with which it had been playing a few minutes before with no sign of recognition or even a sniff at the carcass."[252] He adds that "in the old days when pigs were slaughtered in sight of their companions, those awaiting their turn would rush in and drink the blood as it ran from the throats".

In the case of these primates and domestic animals, lack of interest was probably the appropriate biological response to the death of one of their group members. There is nothing the others could do about it and no value in their taking any avoiding action. What evidence there is from the wild, shows that sudden death such as that produced by a distant gunshot or a silent arrow, has in itself little or no effect on the survivors. If it is accompanied by sight or sound or smell of the predator which produced that death, then the reaction is very different, but the flight of the remaining grouse or gazelle is a response to the killer and not to the killed.

Animals on the whole seem to recognize that something has changed, but are no better than we at pinpointing a critical moment. There are many accounts of mothers carrying around dead young individuals until they decompose. There are stories of elephants and buffalo remaining with a stricken herd member and attempting fruitlessly to lift the dead animal back on to its feet.[296] There are ways, some of them may even be instinctive, in which social animals can assist a young or injured group member. Konrad Lorenz describes how greylag geese will stand with outspread wings over a dying friend, hissing defensively. He adds, "I observed the same behaviour on the occasion of an Egyptian goose killing a greylag gosling by hitting it on the head with its wing; the gosling staggered towards its parents and collapsed, dying of cerebral haemorrhage. Though the parents could not have seen the deadly blow, they reacted in the way described."[168] The defensive behaviour under these circumstances was appropriate, it had survival value for the gosling who may only have been temporarily concussed, but there comes a point where the species members can do no more

for their fellow. Recognition of this moment may have to be learned.

George Schaller, in his account of the mountain gorillas of Kisoro, tells of a young animal that refused to leave the body of its adult companion. "It was a brutal choice for such an infant to have to make: escape man and enter the forest to wander alone in search of its group, a task for which it was unprepared, or cling to the last vestige of its former happy group life, a dead leader who for the first time failed to protect it. Finally the youngster was captured, only to die later in London Zoo."[237]

Compare that account with this one by Robert Kastenbaum of an eighteen-month-old human child's first contact with death in the shape of a dead bird. The boy recognized it as a bird . . . "but he appeared uncertain and puzzled. Furthermore he made no effort to touch the bird. This was unusual caution for a child who characteristically tried to touch or pick up everything he could reach. David then crouched over and moved slightly closer to the bird. His face changed expression. From its initial expression of excited discovery it had moved to puzzlement: now it took on the aspect of a grief mask."[141]

In both gorilla and human child we find incomprehension of death at first contact with it. A few weeks after David's first dead bird he came across another and his reaction to this was completely different. "He picked up the bird and . . . reached up towards a tree, holding the bird above his head. He repeated the gesture several times . . . accompanying his command now with gestures that could be interpreted as a bird flying." When putting the bird back in the tree repeatedly failed to bring it back to life, David accepted that this was not going to work. "He looked both sober and convinced" and then lost interest altogether.

There seems to be no predisposition in any species to behave towards death in a certain way. Exposure to death elicits an apparently random response in a naïve young individual on the first occasion. What happens on subsequent exposures is determined very largely by experience of and since the first one. Human children are to a certain extent prepared for their first death contact by a variety of on–off experiences very early in

life. Cycles of light and dark, patterns of waking and sleeping, games of hide and seek all introduce the contrasting notions of being and not-being. Adah Maurer claims that the term "peek-a-boo" comes directly from an old English phrase meaning "alive or dead".[177] Gradually a child learns that although some things come and go with regularity, others go away completely and never return.

The development of a child's awareness of death seems to pass through several clearly defined phases. First of all very young children, less than five years old, do not recognize death at all. Everything is regarded as living. A child might bring home several pebbles at a time so that these should have company and not feel lonely, or perhaps turn a scarecrow round so that he should not always have to look at the same view. Children of this age assume a perfect continuity between all things, they make no attempt to differentiate between living and non-living bodies. This may be because they possess no criteria by which to make such distinctions, because they have not yet been taught the supposed differences, but it is very tempting to compare this primitive animism of the child with the new "cosmic consciousness". Knowing with what extraordinary clarity children often see the most complex things, I cannot help wondering how much truth there may be in this widespread early belief in universal life. When children from Hungary,[201] China,[122] Sweden,[140] Switzerland[214] and the United States[230] all come up with the same notions, can we afford simply to dismiss them as childish?

Later, as a child learns or is taught our interpretation of reality, early animism becomes slightly modified. Children are forced to recognize death, but between the ages of five and seven they negotiate a compromise and start thinking and talking about death as a temporary state. One five-year-old refers to his pet as "not very badly killed" and another of six explains that when someone is dead "he feels a tiny little bit, but when he is quite dead he no longer feels anything".[201] Maria Nagy makes light of these reactions in which children regard life and death as interchangeable, as though the whole idea were outrageous; but is it? Many wholly adult communities keep right

on believing that death is not inflexible. In the Solomon Islands they use the word *mate* for someone who has died, but their burials are festive occasions because *mate* is a state like puberty which can last for years and merely leads on to other levels of life.[233]

Then, under further relentless pressure to conform, children between the ages of about seven and nine give up their childish notions of harmony in life and death and seek an adult refuge in the personification of death as a skeleton or bogey-man. At about this time too a child starts trying death on for size by acting it out in games like cops-and-robbers that involve playing dead. This imitation of the death state in play seems to be the most effective way of accommodating the idea into a workable outlook on life, so that by the age of about nine most children have finally reached the point of accepting death as the "permanent cessation of all vital functions".[23] In the words of Carlos Castaneda, the child knows the description of the world and has earned his membership in it "when he is capable of making all the proper perceptual interpretations which, by conforming to that description, validate it".[44]

No serious study has ever been made of death or death-awareness in any species other than our own, but there are anecdotal scraps and odd experimental findings which fit together to produce an astonishing pattern. As this picture takes shape; the notion of universal continuity begins to look less and less childish.

Rosalia Abreu, the first person ever to breed chimpanzees in captivity, tells of an incident that occurred on the death of a female in her collection. At the moment that this chimp died in an indoor area, her mate who was outside in the park, began to scream. "He continued to scream, looking about as though he saw something" and later, when another chimp died he did the same thing. "He screamed and screamed and screamed. And he kept looking and looking with lower lip hanging down, as if he saw something that we could not see. His scream was different from anything I have heard at other times. It made my flesh creep."[292]

Under most circumstances, animals apparently pay little

heed to death, but there are some situations in which an ability to respond to dying would have survival value. Predators usually stop trying to kill their prey as soon as it stops trying to get away, but it is unlikely that they are reacting to death itself. Their innate killing patterns are designed to respond to key stimuli produced by the living, moving prey and when these signals stop coming in, the behavioural sequence of catch and kill runs to its natural conclusion. After a lioness kills a zebra and she and her group have eaten their fill, others move in to finish off what is left. Hyenas and jackals are undoubtedly attracted to the site by sounds and smells, but vultures seem to use some other cue and often zero in on even a hidden corpse with uncanny precision. We know that they have superb eyesight enhanced by a grille structure in front of the retina which is designed to accentuate even the most distant movements, and that as soon as one vulture spots food others come spiralling down in his wake, but sometimes this just does not seem to be enough to explain their presence. I have seen vultures arriving in the dark to sit like impatient pall-bearers around an antelope that had been shot, and on these occasions there were no mammalian scavengers around to attract their attention.

I am not suggesting that vultures are able to diagnose death at a distance, but I do believe that in some situations a signal goes out from a dying organism and that this alarm is particularly strong when the attack on it is sudden and violent. It seems likely that the signal began as a warning and was originally intended only for members of the same species, but in time and evolution it has turned into an all-species SOS. Depending on the circumstances and the species involved, this signal can simultaneously be read as "Help, I need assistance"; "Look out, there's a killer around"; "Relax, he's eating someone else" or "Come on, dinner's ready." There is value in all these communications and economy in the fact that all are based on a single signal given by a single individual in trouble. I believe that there is now sufficient evidence to show that such a system does in fact exist.

The story of how Cleve Backster discovered that plants were able to respond to other species has now become almost part of

folk-lore, but it is worth repeating the details of his first experiment. In 1966, Backster found that plants attached to an instrument designed to measure electrical resistance were producing measurable responses in certain situations. He put this to objective test by designing automatic randomizing equipment that would drop small crustaceans one by one into boiling water in one room while a potted plant in another was attached via the usual electrodes to a polygraph.[7] He found that the plant was producing significant electrical changes at the precise moments that the brine shrimp fell and that there was no equivalent read-out on the recording tape when the machine dropped dead shrimp.

These findings were published in 1968 and created so much interest that Backster now leads a double life. By day his offices near Times Square in New York carry on their old function of training police officers in the use of sophisticated electronic equipment, but at night the lie-detectors and electroencephalographs are wheeled into new positions to monitor organisms not even remotely suspected of a crime.

Backster found that his plants were not only tuned into dying shrimp, but responded to all kinds of life. They reacted wildly to an egg being broken in the room.[7a] This suggested not only that the plant was aware of life and the damage to life around it, but that the egg might be actively involved and could itself be producing some kind of transmission. The fact that a non-fertile hen's egg consists of a single cell, showed that the signal and the response might occur at a cellular level, so he began experimenting with more simple biological material. A single egg was attached to an electroencephalograph and balanced into the circuitry and then at 06·44 on 11 April 1972, a second egg was dropped into boiling water twenty-five feet away.[8] Exactly five seconds later, the flat line recording on the tape flickered into a sudden crescendo that took the pen almost off the edge of the paper. The egg reacted at the precise moment that something happened to another of its kind.

This fellowship of sensitivity seems to be most marked between samples of living material taken from the same source. On 3 December 1972, Backster put silver-wire electrodes into a

sample of fresh human semen.[8] At 08·51 the donor, sitting forty feet away, crushed a glass phial of amyl nitrite and sniffed the corrosive contents. Two seconds later, as the chemical damaged cells in the sensitive mucous membrane of the man's nose, his isolated sperm reacted in sympathy. In control tests it has been found that sperm produce no response to non-related humans. I have myself tried similar experiments, both with blood samples and with epithelial cells taken from the roof of my mouth. If one separates these samples into two parts and treats one with concentrated nitric acid, the other will often produce a measurable response on sensitive electrical equipment.

There is only one thing that rubber plants, brine shrimp, vultures, eggs and sperm all have in common—they consist of cells, so it is fascinating to find that these responses occur at a cellular level. If, as I suspect, the signal is one accessible to all life, then it would have to be produced and perceived at this level of the lowest common denominator. I believe that it probably began as a comparatively simple pattern of communication between separate cells within a single organism, perhaps before the development of a proper nervous system. Plants lack co-ordinating nerve networks and yet some of them are able to orchestrate their cells into such precise harmony that whole batteries of thousands will respond simultaneously with a movement fast enough to catch a fly. The mechanism producing this response is still a mystery, but Backster may have found the answer.

The next step could have been for cells, such as pollen grains or sperm, to carry this sensitivity beyond the bounds of the organism to produce new individuals that could enjoy an independent existence and yet still maintain vital contacts with others of their kind. Then it is possible that compromise signals were developed among groups of closely related species, perhaps in response to a common predator. The predator would then find it necessary to tune in to the same wavelength in order to be able to detect these signals and thus anticipate their effect on the behaviour of his prey. Finally, both predator and prey would find the signal useful in giving warning of some natural catastrophe that could affect them all. This scenario for the

development of what Backster calls "primary consciousness" in all living things, is purely theoretical, but it is the kind of path that evolution often takes. It is seldom that a need is allowed to exist for very long without nature taking some steps to meet it.

If a network of communication does exist between all living things, then one would expect to see it most dramatically manifest in times of crisis. Spontaneous human telepathic contacts most often occur when one of the people involved is in danger or dying. The death signal may be just the "loudest sound" in this universal language and therefore the one first to come to our attention. There is evidence to show that it is more than just a simple on–off alarm system.

When Backster was doing the brine shrimp experiment, he noticed that the plants became increasingly unresponsive to the animals. It seemed to him that the plants "realized" that what was happening to the shrimp in no way threatened them and that they became habituated and just stopped listening.[76] This makes biological sense. In other aspects of Backster's work he has found that plants also tend to become positively or negatively conditioned to other individual organisms depending on their experience with them.

In my own work, I have come across a situation which suggests that plants do have the ability not only to respond to other life nearby, but to remember the conditions associated with that response. On a number of occasions, in different laboratories and with different equipment, I have played a botanical version of the old parlour game called "Murder". Six subjects are chosen at random and told the rules of the game. They draw lots and the one who receives the marked card becomes the culprit, but keeps his identity secret. Two potted plants of any species, although they must be of the same species, are set up in a room and each of the six subjects is allowed ten minutes alone with them. During his period, the culprit attacks one of the plants in any way he likes. So at the end of the test hour, the foul deed has been done and one of the plants lies mortally wounded, perhaps torn from its pot and trampled into the floor. But there is a witness. The surviving plant is attached to an electroencephalograph or a polygraph and each of the six

subjects is brought in briefly to stand near the witness. To five of these, the plant shows no response despite the fact that some of them may have spent their periods in the room after the deed had been done; but when confronted with the guilty party, the plant will almost always produce a measurably different response on the recording tape.

It is entirely possible that the machine, or the combination of the plant and machine, are responding to an electrical signal produced by the culprit's knowledge of his own guilt. It is also possible, because I have always been present at these tests, that I may be influencing the machine in some way; but on one occasion there was a result that seems to show that these are not the answers. During that particular experiment in Florida, the potted cyclamen accused two of the six suspects. I called these two back for further questioning and discovered that one was indeed the culprit, but that the other had spent an hour earlier that same morning mowing his lawn. He came in, with no guilt feelings, but to the plant it was apparent that he had "blood on his hands".

This experiment does not work every time, but it has now been successful sufficiently often for me to be certain in my own mind that plants not only respond to other living matter around them, but that they can distinguish between individual organisms and make an apparently lasting association between a signal and a particular individual. The response so far observed is not sufficiently reliable for it to be used as evidence in a court of law, but with more sophisticated equipment the incredible possibility exists that we might yet see plants being taken from the scene of a crime and held in protective custody as material witnesses.

Scientific attempts to assess the possibility of a universal language of life began early this century in India with the inspired work of Jagadis Chandra Bose. The publicity given to Backster's discoveries has provided a new impetus during the last five years and now students everywhere are toying with the consequences of loving, talking to, praying over, caressing or just looking admiringly at plants. The Findhorn Community claims to commune directly with the spirits of their plants—and

they are actually growing bigger and better vegetables. At the Institute of Psychological Sciences in Moscow an attempt has been made to put this interaction on to a more quantitative experimental basis.[819]

Tanya, a good hypnotic subject, was chosen for this work because under hypnosis it was possible to make her produce experimental, but otherwise apparently real, quantities of emotions like fear, happiness, anger and grief on demand. She was placed just eight centimetres from a flowering geranium connected to an electroencephalograph. During the series of tests, when Tanya shivered with cold, cringed with fear, laughed with joy or cried with sadness, the plant produced a whole range of electrical responses in time with her behaviour. She could never produce any response on the machine alone and, in breaks between her displays, the plant–instrument combination was kept running and there was no deviation from the normal baseline.

One test produced particularly interesting results for those who, like Backster, began their work with lie detectors. Under hypnosis, Tanya was asked to think of a number between one and ten and told never to reveal it. A new experimenter then counted slowly from one to ten and she answered each number with a decisive "No!"; but the flower identified the lie and the chosen number by responding only to the number five.

In Backster's later work we find more evidence of the sophistication of the universal language and begin to get some idea of its scope. Following his discovery of the egg to egg connection, Backster tried to eliminate the possibility of his own emotions playing any part in the reaction, by automating the experiment.[8] He built a turntable that carried eighteen eggs and moved round slowly to drop the eggs, one at a time at random intervals, through a hatch into boiling water. He found that the receiver egg attached to the electroencephalograph registered a marked response to the dropping of the first turntable egg, but that there was no response to any of the other seventeen unless the gap between them was more than fifteen minutes long. I have repeated this experiment myself and find that the blockage is not at the receiving end, because the egg on the

electroencephalograph will respond just five minutes later to a new egg brought in from outside the experimental area. It seems that the fault lies with the eggs on the turntable, which stop transmitting after the first one falls. The only possible explanation that comes to mind is that, when the first egg falls into the boiling water and produces its alarm call, the other seventeen eggs waiting their turn all "faint"—and that it takes fifteen minutes for them to recover.

Even as I write this, I can feel scientific toes the world over curling up in horror at the whole idea. I know that it sounds absurd and whimsical and I appreciate the dangers of making such wide-ranging suggestions on the basis of so little evidence, but the deeper one delves into this whole area, the more difficult it becomes to keep one's feet on the ground. Every new investigation opens Pandora's box a little wider and lets loose a further flurry of little demons, every one of them inimical to scientific tradition and demanding some radical new approach. To help myself live with this idea of fainting eggs, I grasp in desperation at all available straws and come up (as I do more and more often these days) with something from an anthropological stockpile.

The Cree, like many North American Indians, have a totem pole tradition. These poles serve a vital function in the lives of the community and the cutting and carving of a new one is attended by all kinds of elaborate ceremony. Before any of this begins, the elders of the tribe get together and go out into the forest until they find a tree of the right size and shape. Then they gather in a semicircle around the tree and say, "Now look tree, we are sorry about all this, but you know how important our totem is to us and the old one is all worn out. We need a new pole and . . . you are it." Then, without a backward glance, the elders rush on into the forest and cut the very next tree of the same size and shape. To my knowledge, nobody has ever asked the Cree why they do this, but knowing what I now do about those eggs, I begin to understand. Perhaps the trees in that part of the forest faint when the first one is threatened? Perhaps by the time the elders cut the second one, it has not yet revived?

This is all very nebulous. Too little is known and too little

real research has been done for any firm conclusions to be drawn. Yet, in the lives and ways of those who live in close touch with the natural world, I keep finding notions that feel right, ideas that fit; but intuition is no substitute for precise, clearly defined, repeatable experiment. Or is it?

At this moment, at any rate, we are left with the following situation: Death has proven to be impossible to diagnose. None of the traditional signs is valid and history is full of examples which show that reliance on any or all of them inevitably leads to confusion in which the living are sentenced unwittingly to fates worse than death. Life and death blend almost imperceptibly into each other and, with life extending its limits all the time, it becomes clear that there are degrees of death and that most (or perhaps even all) of these are reversible. Death comes to seem less permanent and more like a temporary affliction. Children show no innate response to the states of death, but tend on the contrary to behave as though it did not exist. Regardless of their origins, they persist in crediting all objects with life and the ability to interact—and the latest research suggests that they may well be right.

I believe they are. I am becoming convinced that it no longer makes biological sense to even try to discriminate between life and death at any level.

Chapter Three

DYING as part of the death cycle

THERE is a record of a captive chaffinch that lived for twenty-six years. Eventually the little bird died of old age, but in the wild there is no such thing as an old chaffinch. Small birds and mammals never age, simply because they never live long enough to do so. With an annual mortality rate of over fifty per cent, no individual can expect to live more than a few years. Everyone dies young.

The human situation differs in that many reach old age. Even three thousand years ago, when the average life expectancy was less than thirty, there were those who lived for "three score years and ten". Today medicine has lifted the average until, in some countries at least, it nears the biblical limit, but it has so far proved to be impossible to extend the limit itself. We have changed the shape of the curve of survival so that practically everyone has the chance of getting through infancy and adulthood to seventy, but even in Britain only one in every ten thousand will reach ninety years. Our species, like all others, has a typical and fixed life span.

Biology sees this as a circular rather than a linear pattern and describes it as a series of changes or a life cycle. At any given point on this cycle there is a definite chance that an individual can die, but as the circle turns the level of probability increases. A man of seventy is about three times as likely to die during his next year as a man of thirty and about fifty times as likely as a boy of ten. This is what we call ageing. Much of our social planning and all our assessment of life insurance is built around

an awareness of such a decline. The process of dying is therefore not confined to old age, but something that starts right at the beginning of a life cycle and follows it all the way, passing through a series of recognizable and definable stages.

The traditional definition of a life cycle is "a progressive series of changes undergone by an organism from fertilization to death". Now that we have questioned the validity of death as a fixed point and shown that it exists throughout life, we need a new definition. It should be one that includes the notion of change in state and recognizes the possibility of the cycle extending beyond the equivocal condition we have been calling clinical death. Perhaps we could define the cycle as "a series of changes in the organization of matter from fertilization to goth".

The development of an organism proceeds according to a schedule geared to the cycle, but in man a point is eventually reached when we become aware that the balance has shifted from prevailing order to a dominance of disorder. It is at this moment that we acknowledge that we are dying. The most revealing insights into this state of mind come from those who have been very close to sudden death. In 1892, a Swiss geologist fell while climbing in the Alps and was prompted by his experience to collect information from thirty others who, like himself, had survived mountain falls.[206] Albert Heim found that all of them had similar reactions to their seemingly inevitable deaths and, on this basis, he divided the seconds just before the end into three distinct phases of dying.

At the moment a fall begins, the first response is to try to avert the danger, to fight back against the inevitable. Part of this is a purely physical reflex of the kind that pulls a hand away from a hot stove, but there also seems to be a fierce psychological battle against a strange longing to surrender to the danger. We shall see later that this is not destructive, but has survival value. The second stage begins as soon as the faller recognizes the futility of struggling and accepts the fact that death is certain. This brings on a mood of detachment in which the subject becomes engrossed in oddly irrelevant thoughts. One climber described "sensations of petty annoyance and even of

speculative interest".[65] A student who was thrown from a car moving at high speed and went rolling head over heels down a highway, said that his immediate concerns were for his new coat which he could see ripping as he rolled, and for his school football team which according to the car radio were losing their latest match. In another case, a child who fell from a cliff was afraid only that he would lose his new pocket knife.

Soon these stray thoughts crystallize into the classic life review. In 1972, a nineteen-year-old skydiver in Arizona fell from over a thousand metres and broke nothing but his nose. He described how he started screaming as he fell and then "I knew I was dead and that my life was ended. All my past life flashed before my eyes. It really did. I saw my mother's face, all the houses I've lived in, the military academy I attended, the faces of friends, everything."[299] Heim reported that "I saw myself as a seven-year-old boy going to school, then in the fourth grade classroom with my beloved teacher Weisz. I acted out my life as though I were on a stage upon which I looked down from the highest gallery in the theatre." A thirty-four-year-old nurse in a near fatal coma induced by an allergic reaction to penicillin, spoke of vivid colours and of how she saw a doll she once owned and was struck by the bright blue of its glass eyes.

One psychiatrist explains this visual review as "an emotional defence against the thought of extinction" and suggests that, deprived of his future, a dying person concentrates his last vital energy on recapturing what was precious to him in the past.[206] Another describes the pictures as "screen memories" and thinks that the ones chosen to be reviewed at this time would prove on analysis to be connected with an unpleasant experience.[123] The most comprehensive survey of responses among those reprieved at the last moment, lists over three hundred cases and finds flashback experiences in only twelve per cent, but it is obvious from the data that all of these were sudden death situations like falling or drowning in which the time span was very short.[138] When life was threatened in a more leisurely fashion by illness or by a situation such as being locked in an airtight freezer, there were invariably no life reviews.

Finally, and remember we are dealing with a sequence of

reactions condensed into a few seconds, the flashbacks stop and are replaced by an extraordinary mystical state. The drugged nurse had an experience of ecstacy in which she was "idyllically absorbed in contemplating a picture of the Taj Mahal". A climber who fell from the Dolomites recalls "my body was in the process of being injured, crushed and pulped, and my consciousness was not associated with these physical injuries, and was completely uninterested in them."[65] Heim's survey of Alpine accidents ends with the comment that death through falling is very pleasant and that "those who have died in the mountains have, in their last moments, reviewed their individual pasts in states of transfiguration. Elevated above corporeal grief, they were under the sway of noble and profound thoughts, heavenly music, and a feeling of peace and reconciliation. They fell through a blue and roseate, magnificent heaven; then everything was suddenly still."

This transcendent state is so powerful and so pleasant that those who experience it are unwilling to leave. Recalling her rescue from drowning as a child, one woman says, "I saw the efforts to bring me back to life and I tried not to come back. I was only seven, a carefree child, yet that moment in all my life has never been equalled for pure happiness."[299] There is some evidence to suggest too that failed suicides who get as far as having this experience go back and try again—usually with more success.

The marked similarity between transcendence under the threat of death and transcendence under the influence of drugs, shows that dying is intricately involved in living. The stages of resistance, flashback and transcendence are experienced in the brief period that precedes sudden unexpected death, but there are direct parallels in the very much longer phases that occur when dying takes place as a result of illness or old age.

Elizabeth Kübler-Ross interviewed over two hundred dying patients and found five distinct stages in their approach to death.[153] The first reaction to learning of a terminal illness is usually "No, not me, it cannot be true." This initial denial is very much like the first desperate attempts of the climber to negate the act of falling. Then as soon as the patient admits that

it must be true, denial is followed by anger and frustration. "Why me, when I still have so much to do?" Or this stage may be replaced by bargaining in which patients make promises to themselves or others in return for extra time. Then, when the full implications of the illness are realized, comes a time of fear and depression. This stage has no parallel in sudden death experiences and seems to arise only out of situations in which the person facing death has time for dwelling on the circumstances. A tremendous amount of research has been done on the fear of death and dying and most of this seems to assume that everybody is naturally afraid of death, but skimming through the vast literature on psychological responses to death, I am impressed by one fact. This fear is manifest only in adults and only when they have time to think about it. There is absolutely no evidence to suggest that such fear is a natural and inevitable part of our dying behaviour. On the contrary, in cultures where death is dealt with more openly and seen as a part of the living process, there is no fear of dying. In other species, there is nothing to show that death is one of the stimuli which release instinctive avoidance or distress responses. When young chimpanzees reach a certain age, they will without instruction or training, avoid contact with snake-like objects. They have a built-in tendency to react fearfully to stimuli that could be associated with danger, but I do not know of a single organism that manifests a natural fear of death itself.

The final stages of the cycle that precede clinical death are the same for sudden or slow death patterns. When terminal patients have had enough time, or been given enough of the right kind of help to conquer their fears and accept the inevitability of dying, they often experience feelings of peace and contentment.

So it seems that the dying process comprises a distinct phase of human development with its own sequence of orderly, definable experiences and behaviour patterns. The fact that these stages are not peculiar to people dying only of accident or illness, is shown by the presence of the same steps in dying that has been artificially induced in people who are in perfect physical health. A study of eighteen convicted murderers awaiting capital punishment in Sing Sing prison showed that their

waiting periods in "death row" began with denial (in which they minimized their predicament), followed by anger and fear and ended finally (for those who had sufficient time) in easy meditative detachment.[22]

It may be a little far-fetched, but it seems even to be possible to identify the stages of dying by tracing their parallels through our historical attitudes to death. There is a time of death denial in our history, a time when we refused to believe that death was a natural occurrence and preferred to blame it on someone or something else. This is clearly manifest in the death rituals of the River-valley civilizations. Then comes a time of death acceptance, as shown by the Judaeo-Hellenic civilizations, when death was very real and final. Then a stage of death defiance in which we tried to overcome the reality. St. Paul voiced this Christian attitude with his brave cry of "Oh death, where is thy sting?" And finally, as with falling, we arrive at today's point where civilization is so close to the brink that its only defence against death is transcendence.

Another possible coincidence that helps to reinforce the existence of these stages comes from the latest work on the biochemistry of the brain during the process of dying. These results also show that there are four clearly definable stages. Professor Negovskii of the Soviet Academy of Medical Sciences calls them shock, preagonal state, agony and clinical death.[202] This classification was based initially on experiments in which dogs were allowed to die from loss of blood following the severing of the femoral artery. The first stage begins after two or three minutes when about half the blood has drained away and the blood pressure is substantially reduced. This means that not enough blood is getting to the brain to supply its normal needs of oxygen and sugar and when this happens, the brain reacts by starting compensatory mechanisms that dilate its vessels and mobilize extra blood from storage depots. For a short while these emergency measures work and the content of sugar in blood reaching the brain actually increases.

Our bodies store energy in the form of glycogen which is kept in the liver and the long muscles until it may be needed. In emergencies, adrenaline raises the blood pressure and promotes

the rapid conversion of glycogen back into blood sugar for immediate use. In a matter of seconds the brain is receiving an enriched supply of food and begins to work overtime. This biochemical stage corresponds directly to the mood of mental detachment and flashback that follows the climber's first reflex struggle to avoid falling.

The second stage, which the Russians call preagonal, is marked by dramatic chemical changes in the brain.[86] Activity in the cortex reaches fever pitch and sugar is consumed faster than it can be provided. This activity in the human brain is largely confined to the higher frequencies, with fast beta rhythms interrupted by irregular spikes of prolonged alpha activity. This is exactly the state of mind that is known to occur in meditation and it obviously corresponds to the experience of bliss and transcendence reported by those who have almost died.

The third stage in the Russian sequence is called agony and for a faller it would take place only after he has hit the ground. Respiration stops, eye reflexes disappear and the activity of the brain dwindles almost to vanishing point. In the dogs, agony began when the organic acid waste products of glycose accumulated in the brain and poisoned it. When the brain stops altogether, the Russians recognize this as clinical death, but even at this late stage resuscitation is still possible if the full flow of blood can be restored. But if nothing happens to redress the imbalance in the brain within a certain period of time (in man we have seen that this seems to be about six minutes), then the fourth state of dying becomes irrevocable by present techniques and the organism is considered as dead.

The Russian studies also contribute one further vital clue.[98] They have discovered that a prolonged period of dying, such as that caused by a lung disease, leads to severe depletion of the energy reserves in the early stages and that the brain in such an organism can survive only a very short period of clinical death. In cases where death is sudden or accidental, reserves are high and the organism has the stamina necessary to survive longer periods of total brain incapacitation. The ability to recover following such a stoppage depends entirely on the metabolic state of the organism prior to dying. In experiments with dogs,

it was found that if the animals were in a state of high excitement before dying, their chances of recovery were very small; but if they were already quiet or asleep when dying began, their rate of recovery was enormously increased. So, the detachment and the transcendent states in which an individual relaxes and contemplates the Taj Mahal or a review of past events, have high survival value. The faller who goes into these states has more chance of pulling through a serious injury, or even of surviving clinical death, than one who screams and fights all the way down.

The series of changes that take place in dying therefore follow a fixed sequence for very good reasons, but the sequence can be interrupted at almost any stage. It can also be short-circuited by pain or by fear. It is even possible for the early fear stage to lead directly to terminal clinical death if it is sufficiently intense. We talk about being "frightened to death" or "scared out of our lives". These things do happen.

In Australia, aboriginal sorcerers carry pointing bones made of giant lizard femurs with a thong of human hair attached. When one of these bones is pointed at a man while the death spell is chanted, the victim soon sickens and dies and all the skill and resources of modern medicine cannot save him.[81] African witchdoctors use knuckle bones, European witches make wooden dolls or wax models, Caribbean voodoo priests sacrifice white cockerels and in Greece it is enough just to squint an evil eye. The methods seem to be relatively unimportant, but the effects on the victim who sees the charms or even knows that they have been used, are well documented.

Several clinical studies have been made on people dying, apparently in perfect physical health, from the effects of black magic. In none of these cases was it possible for the doctors to isolate an organism or injury that might have brought about the obvious physical decline of their patients—all they could do was record the symptoms. In a case of voodoo enchantment, the victim began to breathe very rapidly and his heart beat faster and faster until it was in constant contraction and he died of cardiac arrest.[40] Haematocrit readings taken during dying showed that there was a rapid increase in the concentration of

the blood caused by fluids passing out of circulation into the tissue spaces. It was almost as though someone were operating on the victim with an invisible knife, because these are exactly the symptoms produced in cases of severe surgical shock.

In other instances of voodoo death, doctors have returned verdicts of "sudden haemodynamic alternation"[29] and "paroxysmal ventricular tachycardia",[108] which are merely different ways of saying that the heart stopped. Yet others put the blame on "an over-exuberant oxygen conserving reflex"[289] or "cataleptic death due to oxygen starvation".[181] These diagnoses are unimportant. The ultimate cause of death in every case was brain damage due to lack of sufficient oxygen following failure of the blood to reach its destination; but this tells us nothing about what produced the malfunctions to begin with. There is little doubt that changes in the body, even ones as severe as these, can be produced psychosomatically. Stephen Black tells of a skin cancer, diagnosed by biopsy at the Lagos General Hospital, which apparently was cured by an ointment provided by a local witchdoctor. When the ointment was analysed in London, it was found to contain nothing but soap and wood ash.[26] And yet, all too often the term psychosomatic is used as a rationalization to cover failure by the physician to find out what was wrong. In the final analysis, no condition can be assumed to be purely psychosomatic until it can be proved that the symptoms are curable by psychotherapeutic methods alone, but in advanced cases of bewitching there is seldom time for therapy. It is very easy to dismiss the phenomena by saying that they are "all in the mind", as though this were sufficient explanation for what happened, but this evasion merely sidesteps the astonishing fact that the brain is able to kill the body bearing it.

In cases of enchantment, where people seem to be literally scared to death, the victims usually know that the spell has been cast and that they are supposed to die—so they do.[12] The possibility still exists, however, that some external force is being brought to bear on them. In Czechoslovakia a series of tests was made between a pair of practising telepaths situated many kilometres apart.[232] The receiver was not told when trans-

missions were to be attempted and yet, at the precise instant that the sender was asked to imagine that he had been buried alive, the receiver had a crippling attack of asthma. When the sender imagined being short of breath, his unwitting friend with no previous medical history of this kind, became short of breath. It looks as though it is possible for someone to control another's physiology even from a distance. In 1959, Stepan Figar of Prague found that intense mental concentration in one man could produce a measurable change in the blood pressure of a second one lying at rest at a distance.[75] Douglas Dean of the Newark College of Engineering recently discovered that when someone thinks hard about a close friend, no matter where they may be, that person registers a measurable change in blood pressure and volume.[146] Using this response as a means of communication, Dean has managed to send simple Morse code messages from New Jersey to Florida, entirely without the knowledge of the receiver, who just lay quietly attached to a plethysmograph.

Whether heart failure is produced by the victim's own brain or by the malevolent thoughts or actions of another, the results are the same. He dies of shock. Sudden deaths of this kind are common in animals that have been captured in the wild or restrained for some reason in captivity. Hares and mice die from rough handling, shrews can even be killed by a loud noise. Disturbances due to building operations or even to the proximity of unfamiliar animals in adjoining cages, have killed large numbers of sensitive zoo animals. Wild birds often die while being handled. Humans have died of fright while being given a hypodermic injection or simply at the sight of someone else's blood. The fact that all these deaths are due to the same cause has been demonstrated in a series of grim experiments performed at the Johns Hopkins Medical School in Baltimore.[222]

Curt Richter has an unpleasant piece of apparatus there in which he tests the effects of stress on rats by forcing them to swim in narrow-mouthed jars from which there is no possibility of escape. He prevents them from resting or floating by jets of water that produce a constant turmoil and he keeps them there

until they die. Under normal circumstances domestic white rats survive in this machine for days, while freshly captured wild brown rats die in a matter of minutes. Post-mortem examinations show that the brown rats die of shock produced by overstimulation of the vagus nerve which leads from the brain to the heart. The same symptoms can be produced in white rats by the trauma of snipping their whiskers off before giving them the water torture, but the undamaged white rats eventually die for entirely different reasons. After more than two days in the jars, from which they cannot escape by fighting or fleeing, they simply give up and die of hopelessness.

If the rats were removed from the water just before they died they recovered very quickly and, having learned in this way that the situation was not hopeless, swam for much longer when next returned to the jar. One such conditioned rat lasted for eighty-one hours and presumably would have continued swimming until it died of starvation. It seems that humans under hexing or voodoo sentences of death, behave in just the same way. They die of hopelessness, but if any man survives the test, he never again becomes a victim of enchantment. He has been inoculated against this kind of death.

Occasionally, patients under treatment express the conviction that they will soon die. When they do, it is usually assumed that they have allowed themselves to die by giving up in the same way that objects of witchcraft submit to lethal helplessness, but there is another possibility. One psychiatrist who examined cases of this kind found among them a preponderance of heart and kidney disorders.[17] He suggests that chronic disorders of these organs involve sudden changes in physiological equilibrium which would quickly make themselves known to the patient. It makes sense to assume that the person would be the first to know when disintegration produces a marked change in his own internal weather. If the change is severe, he is well aware of this and becomes pregnant with death, delivering right on schedule.

There are many anecdotal accounts of animals which seem to possess the same intuition and creep away somewhere to die. The elephant's graveyard is pure myth, but the stages of dying

follow each other in such faithful sequence that it is not unreasonable to regard them as classic appetitive behaviours leading to the final consummatory act of goth. The fact that we never seem to get the chance to practise these behaviour patterns, that dying is something that happens only once to each individual, has led several scientists (most notably Freud) to develop the concept of a "death instinct". There is certainly ample evidence in man of strong tendencies towards self-destruction, but there is little to show that the source of these destructive forces is instinctive. I believe that the apparent headlong plunge towards death in certain circumstances is proof rather of an instinct for the patterns of dying. We become familiar with dying even before we are born and we live constantly in its company. The surprise is, not that we should become conscious of it in certain circumstances, but that it does not play an even more active part in our awareness of ourselves and of the things around us. Death is not an all-or-nothing phenomenon. There is ample opportunity in many aspects of our daily lives for us to practise it.

It is possible that our first direct death-like experience is being born. Few people ever again make a journey so fraught with danger as that terrible trip down the ten centimetres of birth canal that leads to the open air. We will probably never know exactly what goes on in a baby's mind at this time, but the chances are that it experiences something like the stages of dying. When labour begins and the uterus makes its first terrifying attempts to eject the child from the warmth and security of the womb, the reaction of the foetus must be to resist. In Scotland recently an attempt was made to induce labour by rupturing the amniotic membranes of a woman who was seriously overdue. A pint of uterine liquid was removed with a catheter and the maternity team were gathered round waiting for the action to begin, when the foetus produced three loud cries of wrath from inside. A perfectly normal baby boy was finally delivered nineteen hours later.[248]

Early resistance and denial of birth must eventually give way to an acceptance of the relentless pressures of the uterus. It would help the birth process a great deal if the child could relax

in a state of co-operative detachment. It seems that we really are aware of what is happening to us at this time and can even remember details of it many years later. Under hypnotic regression, which involves taking subjects step by step back through their lives, many have been able to recall details such as being born head first or feet first, of having the head gripped by forceps or being almost strangled by the umbilical cord.[145] There are always other possible interpretations of "memories" of this kind, but in some instances the facts are ones which are unknown even to the subjects' mothers, but could be checked against clinical records.

Birth and death have the fact of separation in common. At birth a baby is for the first time wrenched away from its mother and, as it grows, further separations of longer and longer duration occur. These may give the child the chance to master the contrasting states of togetherness and isolation, of being and non-being. Adah Maurer says, "By the time he is three months old, the healthy baby is secure enough in his self feelings to be ready to experiment with these contrasting states. In the game of peek-a-boo, he replays in safe circumstances the alternate terror and delight, confirming his sense of self by risking and regaining consciousness."[177] In a sense, he is alternating between life and death.

Later, the child plays more active life-and-death games in which the reality of death is tested under a variety of circumstances by acting out killing and dying and being dead. Play is rightly coming to be considered as one of the most serious forms of behaviour. One in which formidable ideas, which would normally be highly traumatic, can be tolerated and even enjoyed while they are being tested. Many animals play in a way which enables them also to practise skills that will be important to them later in life. Some even play dead.

The American opossum *Didelphis virginiana* has given its name to the behaviour that it produces when attacked.[80] "Playing possum" involves collapsing with the eyes open, lying on the side with the legs extended and claws grasping the ground. In this condition the animal is wide awake and shows no change in body temperature, oxygen consumption or blood chemistry.

Records of its brain waves are identical to those of a normal highly alert individual. A group in Los Angeles explored the response in detail by implanting electrodes in the brains of a number of opossums and getting them to feign death by shaking them with an artificial dog jaw while playing recorded barks and growls through a loudspeaker.[205] Electroencephalographic records show that the animal is highly alert to everything that happens and is actually "pretending" to be dead. On the other side of the Atlantic, hunters report that a fox "when feigning death, will often cautiously open its eyes, raise its head, look around, and finally scamper off, if its pursuers have withdrawn to a safe distance."[43]

Very often the animals produce postures that are far more death-like than real death. Charles Darwin pointed this out by collecting seventeen different species of death-feigning insects and comparing their simulated death position with the postures adopted by insects of the same species that had died naturally or been killed slowly with camphor. He found that "in no instance was the attitude exactly the same, and in several instances the attitudes of the feigners and of the really dead were as unlike as they could possibly be."[58] This makes it seem that these species are not so much imitating death, which very often looks rather lifelike, but are acting out some other animal's idea of how their death should look. The response is obviously audience-oriented and in the course of evolution it is the predators who have determined the death-feigning posture by coming along like drama critics and picking out and eating all the bad actors.

Crustaceans, spiders and insects that feign death, do so at the appropriate moment, but unlike the opossum they lose control of their muscles and adopt a totally rigid state known as tonic immobility. The same condition has been induced and described in birds, guinea pigs, dogs, cats, sheep, chimpanzees and men. The most simple way to put a man into this state is to get him to bend forward from the waist through an angle of ninety degrees, tell him to hold his breath and then use two assistants to throw him suddenly over on to his back. The muscles contract violently and the subject becomes rigid and immobile, sometimes for as long as a minute. The phenomenon is often

seen on football fields when players are suddenly thrown and seem to be seriously injured, until they just as suddenly recover and return to full mobility. There are reports of catatonic conditions among soldiers involved in hand to hand combat where death-feigning, either deliberate or reflexive, could certainly have high survival value.

Many biologists have questioned the value of just lying down helpless in front of an enemy, but the fact that the behaviour of death-feigning exists at all, suggests that it must work often enough to be worth trying. There are obviously certain circumstances in which it works best, and there has to be some sort of limiting factor which controls the automatic response so that it does not get triggered too often or by inappropriate stimuli. The threshold level seems to be quite high, ensuring that this immobility is used only as a last resort in the most desperate situations. Hudson Hoagland, in his studies on the lizards *Anolis carolinensis* and *Phrynosoma cornutum* has discovered a most effective built-in control. If one of these animals uses the response too often, imitation death turns into the real thing, and it actually dies.[119]

One of the few reports on what it feels like to be thrown into the state of unintentional death-feigning, also provides proof of its effectiveness against attack. The explorer David Livingstone was once attacked by a lion which threw him on to his back, grabbed him by the shoulder and began to maul him. He felt "a sort of dreaminess in which there was no sense of pain nor feeling of terror" and when he continued to lie immobile, the lion put him down for a moment and he recovered and made good his escape.[186] Livingstone's detached state of mind sounds identical to that remoteness experienced by the Alpine fallers, and shows yet again that, under certain conditions, the body is capable of drawing for emergency purposes on parts of the sequence of dying. It also demonstrates that these patterns of behaviour can actually have survival value and not only accompany dying, but promote living.

Another common human reaction to stress situations is to faint. Emotional stress produces an overstimulation of the vagus nerve and this slows the heart and at the same time relaxes

blood vessels in the abdomen so that you get that "sinking feeling" as blood gravitates to the gut. This results in a sudden lowering of blood pressure in the arteries of the brain and you become unconscious, but as soon as you fall over, your head comes down to the level of your stomach and the flow of blood to the brain is restored. A faint is a reflex, but also obviously one with built-in controls because it produces precisely the conditions necessary for recovery.

Fainting spells were once very fashionable among women of a certain class as a means of dealing with or modifying troublesome interpersonal situations. No doubt some of them found that they could achieve the desired results by merely faking a faint, by feinting, but many of them did actually lose consciousness. Some did so with so much conviction that it was often assumed that they had died. This is an excellent example of a response which is socially conditioned, but which becomes a physiological reality for those able to bring bodily responses under mental control. Fainting is no longer so popular and it occurs less often, but one can see the evolutionary possibilities in this situation. If the social pressures in favour of fainting had persisted for long enough, it could have become a normal and invariable part of our instinctive behavioural repertoire. Fainting still occurs in certain situations, but as Livingstone discovered, there is a higher survival value attached to the kind of death-feigning that allows one to retain consciousness and take advantage of changes in the situation.

The death-like postures of insects seem to be reflexes of the fainting type that place the individual entirely at the mercy of a predator. The opossum or fox which feigns death is using the more advanced technique with all its advantages of flexibility, but the evidence suggests that this state of conscious immobility is initiated by a reflex no less rigid and automatic than that which turns a death-feigning wood louse on its back. To be effective against attack, the response has to be rapid and there is no action in the body that takes place more quickly than a reflex, which short-circuits the normal paths of neural control and bypasses the brain entirely. The reflex and the behaviour it leads to, appear to be inborn and not conditioned because they

appear as fully developed patterns at the age of about four months, even in isolated opossums. The pattern does, however, remain under some sort of conscious control, because the moment the threat disappears, the opossum comes back to life and continues on its way.

Allied to fainting are two other states of collapse that one hears very little about these days. One is cataplexy in which the subject sinks limply to the ground with the eyes closed, completely unable to move or to utter a sound, but remains conscious and fully aware of all that is happening. This is the human equivalent of the state that can easily be induced in animals such as birds or rabbits by suddenly restricting their movement. It is described in older medical texts as "being precipitated by strong emotion and persisting until such emotion be controlled", but it seems to be a thing of the past as it fails to appear at all in most modern medical dictionaries. Perhaps today we simply bury our cataplectics alive. It could be significant that one of the earliest discussions of this problem occurs in a paper "On the signs that distinguish real from apparent death" that was published in the *Transylvania Journal of Medicine*.[243] The author was prompted to explore the subject by the number of vampire scares to which his part of the world is subject. He, and others, have suggested that the destruction in tombs, the broken coffins, torn shrouds and twisted bloody corpses were not so much evidence of vampirism as of the last desperate struggles of cataplectics to free themselves from their premature graves.[175]

The second rare condition is catalepsy which is described as "a sudden suspension of sensibility and voluntary movement associated with a waxy rigidity of the limbs". This still occurs today among catatonic schizophrenics, but it can also be induced in almost anyone by hypnosis. One of the favourite tricks of the "mad monk" Rasputin was to arrange an avenue of living statues in bizarre postures to amuse the neurotic Imperial Court of old St. Petersburg. The same thing is still being done today by irresponsible stage hypnotists. Spontaneous wax-like conditions also occur as a result of sustained rhythmic stimuli. For many years it was believed that catalepsy produced by witch doctors and voodoo medicine men was caused only by tetany, a

rigidity of the muscles brought on by breathing too hard and lowering the acidity of the blood. Stephen Black has recently made a study of the activities of the Yoruba witch doctors in Nigeria and found that they produce a perfect cataleptic state in response to the rhythmic stimuli of drumming and chanting.[20] Once the subjects have been hypnotized in this way, their bodies can be moved into, and will hold, any attitude almost indefinitely as part of a sacrificial ritual.

In mammals it is possible that this pliability is a conditioned reflex that was established before birth, when the foetus needed to be moulded without resistance to take up the shape of the womb no matter how strange this might be. At that time the rhythmic stimuli will have been provided by the steady beating of the mother's heart. Even after birth, one of the most effective ways to soothe and lull a crying baby to sleep is for the mother to hold it up to her breast where it can hear the familiar rhythm. The number of cataplectic young girls that have to be carried out of concert halls on stretchers, bears witness to the fact that pop groups have discovered that pulse-beat rhythms are the ones that work best, even fifteen years later.

The normal pulse rate is about seventy beats per minute, but there are some faster rhythms whose effects are just as dramatic. In 1966 Grey Walter discovered that flashing a light at regular intervals into a subject's eyes would produce strange effects on the brain rhythms and that certain frequencies of flicker, between six and ten times the rate of the pulse, would induce sudden seizures that looked like epileptic fits.[283] This response has now become a valuable clinical aid for diagnosing potential epileptics, but it has also been discovered that most otherwise normal people can be provoked into seizures in the same way. If a feedback circuit is introduced, so that the flashing light is actually fired by the brain signals themselves, this synchronized flicker can produce immediate epileptic fits and resulting unconsciousness in more than half the world's population.

Epilepsy is a symptom, not a disease. It has been shrouded in superstition ever since it first appeared and was assumed to be produced by possession. It has been attributed to St. Paul, Julius Caesar, Napoleon and (with more justice perhaps) to

Dostoevsky, but the fact is that anyone can have an epileptic fit. It is simply a period of disorganized activity in the brain and can be brought on by a head injury, electric shocks, drugs, asphyxia or even a severe bout of fever. These fits which involve muscle spasms and convulsions and lead to unconsciousness, are not merely like epilepsy; they are epilepsy. The only difference between an epileptic and anyone else is that he or she is likely to have this kind of disturbance more often. Sometimes the cause of an attack can be traced to a blood clot or a tumour, but the fits in recurrent epilepsy seem to be spontaneous. They can be repressed by sedative drugs which make the patient drowsy, but these leave the suspicion that perhaps all the treatment is doing is lowering the overall activity of the brain. There is no evidence that the *grand mal* or most severe fits are in any way hereditary, so the possibility exists that they might, like the detachment stage in dying, be psychosomatic reactions produced in response to certain threatening conditions. This suggestion takes epilepsy out of the area of brain damage and neural disorder and makes it a behaviour pattern that can be produced in any normal brain and might in certain situations, have survival value. There are strong resemblances between the phenomena of epilepsy and those of dying; and I suggest that both have much in common with the most familiar of all death-like states—the trance.

Most trance states are conditions of dissociation produced by strongly exciting one focal area of the brain until this produces a reciprocal state of inhibition in other areas.[234] Fire walkers use this technique to prevent the volleys of nerve impulses from the feet arriving at the brain so that, even if they should burn themselves, they feel no pain. It seems likely that religious hysteria provided the same benefits for Christian martyrs and allowed them to enjoy states of bliss even while being eaten alive by lions.

William Sargant has made a worldwide study of trance behaviour and finds that the state is induced everywhere by a combination of rhythmic stimuli and over-breathing.[234] In Zambia, traditional healers cast out evil spirits by holding a patient's head under a blanket and over a smoking brazier, where he is

forced to hyperventilate by breathing very rapidly and shallowly. In Ethiopia, village priests exorcise devils by spraying holy water into the faces of the possessed for so long that they almost suffocate and have to over-breathe. "Bringing down the Holy Ghost" in Trinidad involves hand clapping and rhythmic heavy breathing. The pocomania ceremonies in Jamaica are built around "tromping", which is a rhythm of foot-stamping and peculiar breathing sounds. Warriors of the nomadic Samburu and Turkana tribes in Kenya dance themselves into frenzy and collapse to the accompaniment of sustained drumming. When recordings of all these rhythms are played to European audiences, they are equally effective in putting non-tribal people into the same trance states. Comparisons have been made between these patterns of sound and the old iambic rhythm which was thought to be so powerful that it was banned in ancient Greece unless a priest was in attendance. After the epidemics of plague in medieval Europe, dancing to the point of collapse became quite common and was added to the more drastic techniques like flagellation to bring the nervous system to the final state of trance and collapse.

The point of inducing trance states in all these systems is to heighten suggestibility and to create faith and obedience, but they also have the side effect of releasing nervous tensions, sometimes even those severe enough to be pathological. They produce dramatic cures in cases of severe depression, paranoid schizophrenia and enduring trauma by inducing excitement that leads to exhaustion, collapse and a permanent alteration or restoration of brain function. The Bushmen of the Kalahari call the collapse state "little death" and make no distinction between that induced by rhythmic dancing and that which occurs in epilepsy.[158] It is quite possible that the two are directly comparable and that spontaneous epileptic fits are brought on by the mind in a desperate attempt to shake itself out of potentially harmful conditions. The ease with which those trained in transcendental meditation can bring about fairly dramatic physiological changes, indicates that it is certainly not beyond the capabilities of the brain to create its own internal rhythms of the kind necessary to produce trance and seizure.[283]

If this is true, then epilepsy is not the symptom of a disorder, but perhaps the cure.

There is a well-tried psychoanalytic technique called abreaction in which the therapist tries to release a repressed emotion by forcing the patient to relive the original experience. Sargant treated a large number of Second World War soldiers suffering from combat neuroses by suggesting to them, in a trance state or under the influence of drugs, that they were back in the situation of terror and stress which was disturbing them.[234] Often this would stir up intense nervous excitement that produced violent outbursts of emotion and ended in collapse. When the patient came round, his abnormal preoccupations had disappeared. More recently, the same results have been achieved using electroconvulsive therapy in which the patient is given an electric shock severe enough to produce an epileptic seizure.

Gregory Bateson has invented the concept of a "double bind" to describe the well-known situation in which, no matter what a person does, he cannot win.[14] Following this concept, the therapist who deliberately pushes the patient in the direction of the symptoms, is using a "therapeutic double bind".[13] The technique trades on an equally well-known human tendency to try to verify the unpleasant by seeking repeated experience of it. The tongue keeps probing at an ulcer on the gum and makes it more and more painful.

No such mechanism is recognized in conventional theories of learning, but I suggest that a positive feedback loop exists in our bodies which reacts to certain kinds of discomfort by increasing the behaviour which produced that discomfort; and keeps on with this runaway reaction until a threshold is reached when some major rearrangement takes place. This mechanism could be what Freud called the death instinct and, if it exists, then epilepsy could be the manifestation of this feedback in action. I am suggesting that the body monitors itself all the time and that there are certain circumstances which it recognizes as potentially dangerous and treats by giving itself electroconvulsive therapy, so producing a fit which changes those circumstances and saves its life. On the homeopathic principle of

letting like be treated by like, it trades a temporary "little death" for the more permanent big one.

If electrodes are attached to the stomach of a woman in late pregnancy, the brain waves of the foetus can be recorded. Usually these prove to be slow delta waves at a frequency of less than three cycles per second, but sometimes this regular pattern is interrupted by larger discharges similar to the spiky recordings obtained from adults in epileptic attacks. As the baby approaches full term, these convulsions become more frequent, until at birth they are almost continuous as the child thrashes its way out into the world. We are all born in something like epilepsy and if we survive the experience, it seems highly likely that this could be just the sort of positive conditioning necessary to produce the same response again in later comparable crises. The first seizures in the womb may be brought on by oxygen shortages which occur as the child begins to outgrow the resources of that haven. In the final month of all pregnancies it is common for the child to twitch and stretch as the supply of oxygen begins to lag behind its needs. This results in an increased alkalinity of the blood and that is what seems to push the brain into convulsions in both the unborn child and the entranced or epileptic adult. The birth seizure may end, as adult ones do, with a brief period of unconsciousness—perhaps taking place just at the critical time when relaxation is necessary. Immediately the newborn baby begins to breathe on its own, or the adult crisis passes, the seizure stops and brain waves return to their normal patterns. Very often the subject falls into an easy sleep.

In several West African languages, there is no word for sleep. The verb for sleep is written "to be half dead". In English we speak of being "dead tired" or "dead to the world" and in much psychoanalytic thinking, sleep and death are regarded as synonymous to the unconscious mind. Is there any connection between the two? People frequently die in their sleep, but is sleep a part of the process of dying? I doubt it.

It has been known for some time that the brain contains a centre which is specifically responsible for maintaining wakefulness. The latest research indicates that sleep occurs when this reticular activating system is influenced in one of two ways.[134]

In one, a chemical produced in another part of the brain stem actively inhibits wakefulness, in the same way that a car may be brought to a stop by applying the brakes. This active interference produces light orthodox sleep. The second method involves a different chemical whose effect is analogous to stopping a car by taking the foot off the accelerator. This passive control results in deep paradoxical or dream sleep. If the system that maintains wakefulness is destroyed by injury or surgery, the body goes into a permanent coma. At first the activity of the brain is depressed as it is in light sleep or in the transient coma produced by epilepsy, but soon all brain waves grind to a halt and the subject never wakes again, but becomes a "helpless, senseless, paralyzed blob of protoplasm".[83] In other words, it becomes goth.

There are no marked changes in brain patterns with increasing age. Recordings from eighty-year-olds look much like those from people of forty. It seems that the brain is normally capable of outlasting most of the other organs and that it is usually the failure of one of these that kills the brain by depriving it of oxygen. The dying brain is calm. As the blood brings it less and less oxygen, a few slow waves appear; these then rise in amplitude and finally slowly wane until the pens on the electroencephalograph are drawing long straight lines. This lack of response is identical to that seen in permanent coma, but it bears no resemblance to the rhythmic and intricate patterns of either kind of sleep.

Both sleep and epilepsy are related to dying in the sense that they are seen to be symbolic deaths. Freud suggested that the epileptic attacks of Dostoevsky were death substitutes brought on by guilt about wishing his father dead.[85] It is possible that a person will unconsciously feign death in some way to try and avoid the real thing. The opossum does just this and there are many examples of animals which respond to situations of great stress by simply withdrawing and going to sleep. Robert Lifton in his story of *hibakusha* (those who survived the Hiroshima bomb), reports widespread psychic numbing and suggests that in order to avoid losing their senses altogether, the survivors undergo "a reversible form of symbolic death in order to avoid

a permanent physical or psychic death".[163] Survivors of concentration camps, medieval plagues and natural disasters all behave as though they had been stunned or dazed. This numbness or anaesthesia is so characteristic of the post-disaster syndrome that it must have survival value. By closing themselves off from forces invading their environment, organisms do manage to avoid damage and destruction, but there has to be some awareness as well. In Nazi camps inmates trained themselves not to recognize or respond to the vicious killings taking place around them, but they also practised an exquisite alertness to signals from the environment which enabled them to prepare for the next series of blows.[204] This combination of life and death, of hidden sensitivity in an individual apparently dead, is basic to all behaviour involving death-feigning and death-like states. It is a biological condition and an essential part of the economy of survival.

We find ourselves now on the side of the mortally wounded operatic soprano who has time for an elaborate aria and several encores before she finally fades away. Dying is not just a brief process that immediately precedes clinical death. It can be very brief in cases of sudden death, but even here it seems there is room for complex flashbacks within a series of interrelated phases that follow a predetermined sequence. The weight of evidence suggests that dying is a highly intricate behaviour pattern which is by no means confined to preparation for death. It exists throughout life and parts of it can even be used specifically to foster the continuance of life. We can begin to describe organisms as manifestly "dying to live".

The key to the nature of the confusion of life and death lies in natural history.

Life evolved from the non-living and still depends for its efficient survival on the non-survival of some of its parts. Life and death are indistinguishable, but there is a third and distinct state of goth and a clearly defined series of events which lead to it. These can be manifest at any time of life.

What we have called death is merely a change of state, often temporary and sometimes curable. Death on its own has no clinical, logical or biological reality and exists only as a construct with validity in interpersonal relationships.

When Romeo found Juliet pale and lifeless in the tomb and assumed that she was dead, she *was* dead. The fact that she later recovered and became more lifelike, does not cancel out her death. When Juliet found Romeo lying lifeless with poison in hand, he too was dead and his death would remain valid even if some quick-witted physician had rushed in from the wings and pumped out his stomach in the nick of time.

The Romeo Error is all in the mind.

Part Two

MIND

The mortality rate in life is one hundred per cent. Everyone eventually reaches the point where they are considered to be clinically dead and every society has a well-established pattern for dealing with individuals in this condition.

The Ashanti of West Africa bury their dead below the surface, lying on the left side with hands beneath the head, in special burial grounds set aside for that purpose.[220] The aboriginal Tiwi of North Australia bury their dead above the ground by covering them with huge mounds of earth that are stamped down into place in a funeral dance.[106] The Bavenda in South Africa shut their dead up in their own houses and abandon them, but many people build special death houses.[256] In the Philippines these are constructed of bricks baked only for that purpose. Among Maronite people in the Lebanon, death houses are built of stone, while in Madagascar wood and bones may be used. The Ovimbundu of Angola put their dead in caves,[103] but the hill tribes of India rely simply on exposed rock ledges.[197] The Santee Sioux sewed their dead into deer or buffalo skin and left them in the tops of tall trees.[255] In Assam, where trees are scarce, they build special platforms and in Tibet, where trees are virtually non-existent, they practise air burial.[56] This involves cutting up the body, separating the flesh, grinding the bones into small pieces, mixing it all with barley and feeding this hash to birds specially summoned to the feast by horn.[242] In Mongolia the eagle is known as the nomad's coffin and it is considered a good omen if a body left in "some

lonely, clean and noble place" is quickly consumed by scavengers.[150] Some people prefer to eat their dead themselves, believing that it is better to rest in the stomach of a friend than in the cold ground. In New South Wales the aborigines roast their dead bodies over a slow fire until the flesh is smoked hard. In Bali the dead are burned entirely on special towers in elaborate and riotous ceremonies.[51] In other parts of the world cremation takes place in huge drums, in the house of the deceased or in special crematoria. On the banks of the Ganges there are ghats or stone platforms on which Hindu funeral pyres are lit once the bodies have been washed in the river and smeared with clarified butter. Water may be used instead of fire, as in eastern Tibet where weighted bodies are thrown into the rivers; or in old Scandinavia where important dead were allowed to float in flimsy boats down rivers and out to sea.[142] Sometimes the remains are divided and treated differently—as on Samosir in the Pacific where the body is placed in an underground vault and the skull in an urn on the surface.[18] In Irian, the Asmat headhunters keep the skulls of friends and enemies alike as household ornaments.

Every one of these methods of disposal is accompanied by an appropriate ritual. Habenstein, in his worldwide survey of funeral customs, says, "There is no group, however primitive at the one extreme or civilized at the other, which left freely to itself and within its means does not dispose of the bodies of its members with ceremony."[100] These practices have enormous survival powers and are one of the aspects of human culture most resistant to change. In many cases they provide the most readily available "fossil" relics of lost times and places. Fraser found that the aborigines in New South Wales either buried their dead at full length, lying on their side, trussed up in a bundle or standing erect; or else they placed them in a hollow tree, on a raised platform, covered them with logs or roasted and ate them.[82] On the basis of these characteristics alone, he was able to determine the origins of each family in a very mixed racial area and successfully work out their ancestral movements. Perry made a superb study of anthropological origins in Indonesia and sorted out much of the confusion which today exists

in the thirteen thousand islands of the archipelago, by using the orientation of the dead as his guide.[213] He found that there was a very strong correlation between the burial position and the presumed location of the land of the dead; and that if a Savu islander for instance was buried in a sitting position facing the West, then the land of origin of his race was invariably also in that direction.

Throughout all these many and varied ways of dealing with the dead, runs one central theme. Implicit in every funeral practice is the assumption that death is not the end, that it marks some kind of transition.[276] In his investigation of the Malayan death system, Robert Hertz shows how death is not regarded as an immediate or final event, but as only one phase of a gradual development.[114] The Malays and many others recognize a death process that begins early in life and this belief is reflected in the minds and actions of their communities. The moment that we call death is for them no more than an intermediary stage, a sign that the body should be dealt with in some provisonal way. The Malays bury it temporarily. The Kotas of South India cremate most of the body, but save part of the skull.[170] The real funeral follows only some time later when it is thought that the soul has finally decided to move on. During the waiting period, the dead person is considered to be very much present. In a Kota community, a dead man has a social personality until his funeral. If his wife becomes pregnant after his clinical death, but before his funeral, the child is his and shares his name, his clan and his property. Their society recognizes the biological distinction that we have drawn between death and goth.

In our society, the generally accepted opinion is that death is instantaneous. The only reason for the delay of two or three days between death and disposal is to allow preparations to be made and to give time for friends and relatives to gather. The fact that we are almost alone in this view and that few other cultures regard death in such a precise way, cannot be accidental. Sometimes even we seem a little uncertain in our convictions. The way in which Stalin's body has been moved to and fro in time with the shift of official opinion about him in the Soviet

Union, is an excellent demonstration of the ambivalent attitude towards death even in a materialistic society.[284] The nature of most funeral practices makes it quite clear that the practitioners assume that the dead still live and that elaborate precautions are necessary to make sure that they do not hang around. The funeral rites serve two functions, to keep the dead alive and to keep them away. Hindu cremation ceremonies are directed mainly at inducing the spirit of the dead person to go on to its proper place. The Egyptians took elaborate precautions to confine the dead to their tombs by providing them with everything they could possibly need there. After a Hopi Indian funeral, a relative of the deceased waits at the forest grave on his own and then symbolically closes the trail back to the village by drawing charcoal lines across it.[25] At the climax of a Kota funeral, a pot is smashed in the cremation ground and everyone attending the ceremony runs back to the village without looking behind them. The living go one way, the dead another; and it seems that the ritual works because no Kota community is ever plagued by ghosts.

The relative sharpening of the distinction between life and death that marks our present attitude, probably began in medieval times. Into Europe in the fourteenth century were crowded more disasters, plagues, wars and pestilences than have ever been known at any other place or time. Bubonic plague swept across the continent, bringing repulsive torment, delirium and death to one-quarter of the earth's population; famine strewed the roads with dead and forced those forgotten in prison dungeons to devour one another; the Tartars and the Crusaders ravaged communities already weakened by the epidemics, and fire, earthquakes, measles, smallpox and the Inquisition took care of the rest. During that century the subject of death was central, vivid, intense and all-pervading. Nobody could ignore death and its associated terrors, so the result was a macabre preoccupation with the subject. The only possible counter to the horror was an emotional response in which philosophers, artists, playwrights, poets and ordinary people dramatized and personified death until they were totally familiar with the bleak figure. Painting, carving, caricature and folklore all

made death a commonplace concept and helped ease the burden. If death had been a topic that was socially taboo, the psychological strain on the individual would have been too much to bear, but as it was, he could look around him and see his own concern mirrored everywhere. Everyone was in the same terrible predicament.

As the crisis passed the preoccupation became less intense, but even today we are left with the heritage of a death concern. We tend still to see death in isolation as a phenomenon in its own right to be feared and postponed for as long as possible. In our society the fear of death can have little to do with personal experience. Most of us have never seen a dead body. We have divorced ourselves from death by handing responsibility for the whole dying-death sequence over to teams of licensed experts. We have insulated ourselves from contact with death by giving it a place of its own. There is a sense of discomfort, even sometimes a feeling of outrage, if someone dies in the wrong place or at the wrong time. More than any other society the world has ever known, we have tried to isolate death from our lives, but have succeeded only in building a life-view full of confused beliefs and half-acknowledged doubts.

This confusion is evident in the way our media give emphasis and feature coverage to accidental deaths. Attention is focused on the vivid details of aeroplane crashes and fires and the figures for road deaths following holiday weekends. The implication is that death is something that happens "out there", something that lies in wait for us in other places, rather than something we carry within ourselves. We have been brought to believe that accidents are an important cause of mortality, but the truth is that even in the most mechanized countries, less than five per cent of deaths are accidental. This excessive concern with accidental death seems to mask an insufficient concern with natural death. We have conveniently over-emphasized avoidable death somewhere else as a diversion from inevitable goth right here inside every one of us. In the United States in particular, death has come to be regarded almost as an infringement of every citizen's constitutional right to the preservation of life and the pursuit of happiness.

In this social climate, the beliefs of more "primitive" people in death as a transitional process, are seen as quaint. Anyone here who believes that there is some kind of life in a clinically dead body is regarded with suspicion as a religious crank or as yet another foolish child taken in by some specious Eastern guru.

So, in this second section I will examine the question of survival of death, first by discussing the biological possibility, and then by looking very closely at the evidence which might support such a phenomenon.

Chapter Four

PERSONALITY and the body

The evidence of biology, psychology and anthropology all point towards the conclusion that life and death exist alongside each other in a constantly changing dynamic relationship which ends only when the matter involved loses all trace of the order imposed on it during this association. I have called this point goth. The state that has been identified as clinical death is nothing more than a vernier that slides along this life line, progressing further and further towards the goth end of the scale. I believe that technology will eventually be able to push clinical death all the way to the end, until it is coincident with goth, and that many of our present contradictions will then automatically be resolved.

In the meantime, let us look at that portion of the scale that still lies between clinical death and goth and assume, purely for the sake of argument, that life does persist in some form into this area. We are talking about the survival of clinical death.

Nobody questions the fact that organic activities continue to take place in a body long after the doctor has signed the death certificate. Arguments revolve only around the significance of these activities to the individual that was identified with that body, to the entity called personality. Personality may be defined as that which tells what an individual will do when placed in a given situation. It is a function of the stimuli which that situation provides. The information coming in from any environment is received by the sense organs and conveyed to the brain of the individual, so the whole argument boils down to a

question of whether or not a personal identity can exist without this feedback.

Nocturnal mammals such as cats and rodents, derive a large portion of their information about the environment from sensations picked up by their long sensory whiskers, each of which is attached to a finely divided group of muscles and nerve endings. If these whiskers are cut off, the animal is seriously disoriented and may even die. Curt Richter in Baltimore found that rats whose whiskers were trimmed with electric clippers often behave very strangely. One "pushed its nose into the corners of the cage and into its food cup incessantly with a sort of cork-screwing motion. It was still doing this when we left the laboratory four hours later. The next morning it was dead and neither the cause nor the direct mechanism of death could be determined by careful autopsy."[222] The rat seemed to have died of shock induced by the experience of sensory deprivation following the loss of one of its most important sense organs.

Studies of humans in conditions of sensory deprivation indicate that normal functioning of the brain depends on a continuous arousal of the cortex by signals from the brain stem.[113] This in turn depends on constant bombardment by information from the sense organs. It seems that, quite apart from their normal specific function of providing information about sights, sounds and smells going on outside; the eyes, ears and nose also collect stimuli which have the general function of maintaining arousal in the brain. It does not matter what they provide, so long as they keep on sending some kind of signal. If the signals are too monotonous or cease altogether, then the cortex shows signs of disorder and the brain begins to behave abnormally. Personality changes take place and the individual's perception becomes disturbed. The brain wave pattern changes, thinking is impaired and hallucinations appear. After long hours on the road, truck drivers start to see apparitions such as giant red spiders on the windscreen; airline pilots have mystical visions of flights of angels; and prisoners in isolation develop acute paranoia. These symptoms become progressively worse when sensory stimulation is further reduced and it is said that, if all incoming information could be withheld, the brain would stop al-

together.[277] It seems that a changing environment is essential for human survival. Christopher Burney ends his account of a long stay in solitary confinement with the comment that "Variety is not the spice of life; it is the very stuff of it."[31]

The process of dying, in which sensory stimuli are eliminated as disorder in the organism becomes more and more prevalent, is one of progressive sensory deprivation. We know that the elimination of even one sense system has a deleterious effect on an organism, so how far along this line of reduction can an individual progress before personality and identity become meaningless? In order to explore this question, we need first to know how much of personality is determined by physical factors, both external and internal.

One of the problems that has always faced psychologists working on captive animals, is the variability that exists between individuals in any population. The observed differences in behaviour have been attributed to genetic alteration, experimental error, the temperature of the laboratory and the phases of the moon. All these factors can and do influence the way in which an animal will respond to a given situation, but perhaps the greatest source of variation is the difference in past experience. Seymour Levine at Ohio State University began an investigation into the role of traumatic or painful experience in early life by rearing three groups of rats in different ways.[161] The first group were taken out of their nests at the same time each day and put into a cage where they received an electric shock. The second group were placed in a similar cage, but given no shock and the third group were left in the nest and never handled at all. He expected to find that the shocked rats would be affected by their experience and he looked for signs of emotional disorder in them when they reached maturity. To his surprise he discovered that it was the third group, which had never been handled at all, that "behaved in a peculiar manner". The behaviour of the shocked rats could not be distinguished in any way from the second group that had also been handled, but not shocked. Levine reports in some consternation that, when the unhandled rats became adult, they were unhandleable. He says they "rank as the most excitable and vicious rats we have

ever observed in the laboratory; it was not unusual for one of these animals to pursue us around the room, squealing and attacking our shoes and pants legs".[162]

No biologist would describe this as "peculiar" behaviour. It is a source of great delight to find at least one group of laboratory rats behaving like rats instead of like maze-made clockwork toys. The experiment does however illustrate very dramatically that environmental factors play a large part in determining behaviour, or at least in determining how an individual's inherited potentialities will unfold.

There is an almost perfect human counterpart to this in a long-term study done in Massachusetts. In 1935, a survey was made of a large group of seven-year-old boys from similar poor urban backgrounds. The children were interviewed, physically examined and psychologically tested. Counsellors gathered information on their backgrounds from teachers, ministers, parents and neighbours, and visited their homes repeatedly. Twenty years later, Joan and William McCord tracked down 253 of these boys and examined their current status in the light of their early experience.[195] A number of the boys, now grown to be men, had been convicted at least once of a crime involving violence, theft, drunkenness or sexual violations. When the backgrounds of all the men were classified from the early records it was found that the patterns of family life played a large part in determining whether the child would later show antisocial or criminal tendencies. In the group of boys who were exposed to rigid discipline involving frequent parental physical punishment, thirty-two per cent were later convicted of crimes. Of those whose parents relied more on verbal disapproval or "love-oriented" discipline, thirty-three per cent had become criminal. A third group of boys who were totally rejected by their parents and not disciplined in any way, proved to contain sixty nine per cent who had turned to crime. As with the rats, there was no distinction between the groups who had been handled, regardless of the way they were treated; but the group who had been ignored and neglected were distinctly different.

The McCords were interested in testing the old adage "like father, like son", and found that even where the fathers were

practising criminals, the sons that had been disciplined tended to follow the expressed values, rather than the behaviour of the parent. Going back to the definition of personality as "that which tells what an individual will do when placed in a given situation", it seems fair to conclude that early social experience has a profound effect on the way in which personality is expressed. Personality depends at least in part on external physical factors.

It seems also to depend on chemical factors. Eugène Marais describes what happened to a colony of termites he was watching when their queen was disturbed. A piece of clay became detached from the roof of the queen's cell and fell on her. "The only effect which the shock had on the queen herself was that she began moving her head to and fro in a rhythmic fashion. The workers immediately ceased all work within the cell and wandered around in aimless groups . . . Even in the farthest parts all work had ceased. The large soldiers and workers gathered in great excitement in different parts of the nest. There appeared to be a tendency to collect in groups. There was not the least doubt the shock to the queen was felt in the outermost parts of the termitary within a few minutes."[173] The behaviour of the individuals in the colony was altered when a normal channel of communication was interrupted. This channel is now known to be a chemical one in which contact and a group identity is maintained by a social hormone excreted by the queen and carried to every individual in the colony by mouth to mouth contact. If workers from one nest stray into another colony, they are immediately attacked and killed, but if their queen is destroyed first, the termites of that nest stop work and move to a nearby colony where they are readily assimilated. Without the chemical reinforcement from their own queen, their unique identity is lost and they become anonymous subjects ready to swear allegiance to a new queen and a new chemical control.

Organization in a beehive is maintained in the same way by a compound which is secreted by the queen and distributed democratically so that every bee's attention is focused on the proper sequence of instinctive drives to achieve the necessary

results. This queen substance acts as a unifying agent in exactly the same way that tranquillizing drugs banish symptoms of mental illness, relieve anxiety and allow a human patient to co-ordinate his actions to some constructive end. For hundreds of years an extract of the snakeroot plant *Rauwolfia serpentina* has been used in India for the treatment of a number of ills, including epilepsy and anxiety. In 1953 this substance was introduced to the West as the drug reserpine which acts as a tranquillizer by preventing the hypothalamus of the brain from producing excessive arousal.[118] Now it has been discovered that the queen substance has a chemical structure similar to this controlling agent. In the organism of the termite colony or beehive it is the queen which acts as a brain and, among many other roles, plays the part of the hypothalamus. She is apparently a separate individual, but she cannot exist on her own and removing her from the colony is equivalent to a surgical operation in which the skin of the organism has to be cut to gain access to the internal organs. This group identity is directly analogous to the condition of the normal human body in which the hypothalamus controls emotion without outside help. There is little functional difference between external and internal factors controlling behaviour. For our purposes it is sufficient to know that behaviour, which is an expression of identity and personality, is very much dependent on the social, physical and chemical circumstances in which a body finds itself.

Hippocrates taught the first Greek medical students that temperament depended on the relative proportions of the four main body humours.[132] A predominance of black bile made a man *melancholic*, yellow bile made him *choleric*, phlegm of course made a man *phlegmatic*, and too much blood left him *sanguine*. In 1925, the German psychologist Kretschmer updated this notion by dividing people into frail *asthenic*, muscular *athletic*, plump *pyknic* and inconsistent *dysplastic* types.[152] Like Hippocrates, he maintained that not only temperament but mental disorder depended on body type, and held that schizophrenics were apt to be asthenic, while manic-depressives were more likely to be pyknics. Fifteen years later, William Sheldon put the theory on to an embryological basis by abolishing dysplastics and describ-

ing three basic body shapes derived principally from the three main germ layers of an embryo.[241] He called the rounded one *endomorph*, the athletic type *mesomorph* and the skinny shape *ectomorph*. Both Sheldon and Kretschmer equated the body shapes with special personality types. Round bodied people were said to be extrovert and likely to enjoy full-bodied rococo architecture, opera, romantic fiction and the colourful schools of art. While the lean-bodied introverts tended to be more interested in restrained classical architecture, ballet, formal literature and abstraction in art.

There is something attractive about these correlations. We all know happy-go-lucky, fat, romantic Italians and austere, angular, forbidding Swedes. The trouble is that it is impossible to say how much these personalities owe to body shape, and how much is determined by cultural and racial stereotypes. The expectations of others play a large part in determining our own self-images. Greek men are supposed to be passionate lovers, so they do their level best to live up to the legend. If Shakespeare's Julius Caesar had not prejudged Cassius for his "lean and hungry look", perhaps he could have avoided at least one of the knives in his back.

Sheldon's "constitutional psychology" is based on some extensive surveys in the United States where there is a mixture of racial and physical types that have been more or less detached from their cultures, but it has never been accepted into the mainstream of personality psychology. Objections to it have been made largely on the grounds that it is not possible to decide from the evidence whether the influence of body shape on character is a direct physical one or an indirect social one. Many doubt that there is any cause and effect relationship at all, but very little work has been done in this area in the last thirty years and we are left with a concept that is both obscure and a little tantalizing.

Sexual stereotypes are as common as cultural and racial conventions. There is considerable evidence to show that some personality differences in men and women are produced solely by the roles forced on individuals by the society in which they live, but there are also purely biological bases for psychological

sex differences. Males and females differ in every cell of their bodies. Only males have the small Y chromosome that produces masculine development. If it is absent, then the development proceeds according to the female pattern. It is important to remember however, that genes do not control behaviour, they control chemical processes which in the end produce individuals that are wired up differently and will produce different responses to the same situation.

Females hear better than males; their discrimination and localization of sounds is superior at all ages. Males, on the other hand, see better. These sex differences are not learned, they are present right from the beginning. One psychologist who was trying to train fourteen-week-old infants to look at an object, found that he was able to do so successfully only if he used sounds as reinforcement for the girls and lights for the boys.[286] Later in development, these differences become apparent in the fact that girls learn to talk earlier than boys. They articulate better, write and spell more fluently and acquire a more extensive vocabulary than boys of the same age. The boys on the other hand excel in spatial ability. Their visual skills are manifest in activities such as aiming at a target, arranging objects in patterns or having a good sense of direction.[99] The evolutionary advantages of these differences are obvious. The prolonged dependence of the human baby means that the female is tied to it for several years and under these conditions, she relies a great deal on the skills of communication. The male, being free to move around more easily and also having greater agility and strength, was destined to be the hunter, and good vision and a sense of direction clearly had advantages in this field.

During the course of human evolution, these biological and cultural factors have worked together to produce sexes that are substantially different. The little Y chromosome started a chain reaction that ends with two totally distinctive personality structures. The ethologist Corinne Hutt summarizes the differences in this way: "The male is physically stronger but less resilient, he is more independent, adventurous and aggressive, he is more ambitious and competitive, he has greater spatial, numerical and mechanical ability, he is more likely to construe the world

in terms of objects, ideas and theories. The female at the outset possesses those sensory capacities which facilitate interpersonal communication; physically and psychologically she matures more rapidly, her verbal skills are precious and proficient, she is more nurturant, affiliative, more consistent, and is likely to construe the world in personal, moral and aesthetic terms."[124]

In rhesus monkeys, the very young males threaten each other and indulge in rough and tumble play more often than females. The females tend to sit quietly, grooming each other and to turn their heads away with a rigid body posture when approached. Harry Harlow at the University of Wisconsin found that the infant monkeys showed these sex-typical behaviour patterns even when reared in isolation by a cloth-covered wire model instead of a mother. He concludes that "it is extremely difficult for us to believe that these differences are cultural, for we cannot imagine how our inanimate surrogate mothers could transmit culture to their infants."[105]

It seems clear that at all stages of development, the abilities and personalities of males and females differ due to biological determinants. Arguments about which patterns are better or worse, more or less advanced, are totally irrelevant and depend entirely on what is being measured and by whom. Only one thing is certain in any consideration of the sexes, and that is that they *are* different.

There is little doubt that personality and psychological differences have biological bases. They are determined partly by given genetic factors and partly by the measurable environmental factors to which the developing individual is exposed. The process of personality growth involves a selection of certain factors from the environment and the arrangement of these in a characteristic way. The manner in which it develops is similar to the way in which the unique structure of some solid crystallizes out of a solution in which it floats. A wide range of crystals can be formed from a solution as complex as sea water, but their nature is limited to the kinds of molecule available in that environment. Any change in the environment will be directly reflected in the matter produced there. Even when a personality is fully developed, it can be altered dramatically by a purely

physical malfunction or by the administration of a chemical which interferes in some way with the physiological processes involved in maintaining that personality. Work on the personality differences that occur with ageing shows that some of these, such as lowered confidence and increased cautiousness, are a direct result of physical inability; but there are more subtle age changes, such as increased introversion and lowered emotionality, which suggest that physiological ageing is accompanied by a parallel process of psychological change.[47]

All this points to the conclusion that personality is very much grounded in the body and makes it difficult to believe that anything of the unique character of an individual can survive the elimination of the body on which it depends; but we have not yet examined all the evidence.

Dean Matthews has suggested a working definition of survival which seems to make biological sense. His hypothesis is "that the centre of consciousness which was in existence before death does not cease to be in existence after death and that the experience of this centre after death has the same kind of continuity with its experience before death as that of a man who sleeps for a while and wakes again."[176] This is a valuable idea because it introduces the question of continuity and reminds us that there are interruptions of continuity even in the lifetime of everybody.

We have already decided that sleeping and dying have little in common, but it is worth remembering that when sensory stimuli acting on a body from outside are reduced to a minimum, we tend to fall asleep; and that when stimuli coming from within the body are reduced, this sleep tends to be dreamless. After clinical death, stimuli coming from the outside are reduced to a minimum. We can prove this by showing that the sense organs no longer send electrical signals about these stimuli to the brain. Internal stimuli are also progressively reduced until they cease altogether, so it would seem that consciousness must be even less active in death than it is in sleep. As far as we know, the centre of consciousness is located in the cortex of the brain. Nathaniel Kleitman at the University of Chicago has surgically removed the cortex from dogs and found that when they recover

from the operation, they spend most of their time in dreamless sleep, but they also wake occasionally to eat, drink and excrete before going back to sleep.[148] Consciousness and wakefulness are not synonymous. It is possible to be awake without being conscious and, as dreams show, it is certainly possible to be conscious without being awake.

One of my problems, as a biologist, faced with the thought of a disembodied personality, is that I find it difficult to imagine how this abstract entity could enjoy any kind of experience. Without sense organs, it would have to perceive things by clairvoyance; without limbs, it would be able to act on the environment only by psychokinesis; and without any structures for producing vocal, visual or olfactory signals, it could communicate only by telepathy. None of these things is biologically impossible, but they all differ so radically from our usual ways of dealing with the environment, that any experiences after clinical death will probably be very different from those we enjoy during life and cannot on these grounds be considered as continuous with everyday sensations. The chances are that, if a personality does continue to exist, its character will be so different from the living one that it might be impossible for us to recognize it. The only biological comparison available to us at the moment is the kind of experience we know occurs in dreams.

Dreams include sensations of colour, sound, texture, temperature, smell, taste, pain and all the other experiences we appreciate through our sense organs in waking life. In dreams we run and jump and caress and kill with limbs that seem at the time to be as real as those we use during the day. We meet familiar people or total strangers and carry on involved and often highly intelligent conversations with them completely in our imaginations. It seems that we each have within us all the necessary mechanisms for producing elaborate, coherent and sustained images without any of the external stimuli that form the basis of normal waking perception. In these dream situations, we seem to express our usual daytime personalities. In fact, if the Freudian interpretation of dream content is correct, we do even more than that by allowing expression also of subconscious personality traits normally hidden during the day. So in the dream stream

of consciousness, we have everything necessary to allow a personality to continue to enjoy internally coherent experiences without the need for additional external stimulation taking place simultaneously. This mechanism would in itself be sufficient to explain complete survival of the intact human personality following clinical death, if it could be shown to be independent of body physiology.

One of the oldest theories about dreams suggested that they were produced by the stimuli which the internal organs continue to send on to the brain even during sleep. Freud once tried eating salted anchovies late at night and reported that he dreamed repeatedly of drinking water. Dream laboratory experiments in which a humming tone is sounded or water sprayed on to a sleeper's face, often coincide with reports that include an aeroplane or a waterfall, but there is no evidence to suggest that most dream images arise in this physiological way.[169] All dreaming is accompanied by an extraordinary internal frenzy. In 1952, rapid movement of the eyes was associated with the onset of dreaming and provided the first reliable indicator of the switch from orthodox sleep to the dream state, but it is by no means the only physical change that takes place. Pulse rate and breathing become erratic, blood pressure climbs above the normal waking levels, oxygen consumption is increased, the level of the hormones adrenaline and cortisone in the blood rises sharply and the temperature of the brain soars to alarming levels. This hot brain is an indication of rapid conversion of energy and is a condition found in waking only at times of rage or crisis. Measurements made on single brain cells show that they change from the slow regular discharge of waking and ordinary sleeping, to explosions of uncontrolled activity the moment a dream begins.[239] The evidence suggests that physical changes which can be measured during dream sleep, are caused by the dream.

Five or six times every night each one of us goes through this bodily ferment. We seem to need to, because if dreaming is prevented, neuroses and undue excitement appear. William Dement and his team at Stanford University worked for some years with cats and found that after more than twenty days of

dream deprivation, the animals became very restless and intense and showed all kinds of exaggerated behaviour.[60] Purely by accident, one of these excitable cats was given a light electrical shock while being attached to a piece of recording apparatus. Normally this stimulus would have produced no marked response, but it threw this particular cat into convulsions. The dream-deprived brain is obviously highly excitable and what usually happens when it is once again allowed to sleep without interruption, is that it goes into a prolonged orgy of dreaming to make up the deficit. After its convulsion had passed, the Stanford cat slept, but the monitors showed that it spent no longer in dream sleep than any normal non-deprived cat. The electro-convulsive shock apparently supplied the release that its body normally received from dream sleep.

Following this dramatic discovery, Dement examined the sleep patterns of human patients before and after they received electro-convulsive therapy.[61] In every instance there was less dream sleep after the treatment than there had been before. The hurricane in the brain produced by electric shock seems to be directly comparable to the storm that rages during dreaming. The dream now begins to look like a form of therapy, a loosing of psychological controls and a way of discharging the waves of nervous excitement that build up in the body each day. It is tempting to compare its actions with the convulsions of epilepsy.

After a fit, most epileptics fall asleep. Many suffer all their seizures during sleep, but very rarely during the rapid eye movement stages. The frequency of the brain waves during an epileptic attack is similar to that seen in an actively dreaming brain and the flicker of light which induces an artificial fit is identical to the frequency that appears at the onset of dreaming. It begins to look as though the epileptic might be someone who, for some reason, could also be dream-deprived. Both epileptic and dream states produce dramatic and necessary changes in the chemistry of the brain, but nobody has yet been able to pinpoint the source of either stimulus with any accuracy. In the fits of *grand mal* and in the fever of lunatic visions in a dream, the systems of the body are pushed dangerously close to

the limits of endurance. There has to be a very good reason for us to expose ourselves to this kind of risk five times a day, every day.

We start dreaming very early. In the dark waters of the womb the faster voltage patterns of dreaming have already begun to break into the long slow waves of relaxation. After birth, a baby spends most of its time asleep and nearly all of this is paradoxical dream sleep. Orthodox sleep hardly occurs until the nervous system has acquired a certain amount of maturity. A newborn kitten spends half its time in the waking state, prowling around with its eyes still shut demanding to be fed, and half in dream sleep.[133] It goes directly from one state into the other without the intervening period of orthodox sleep that appears in all adults. By the end of the first month, the kitten's time is divided almost equally between waking, sleeping and dreaming; thereafter the duration of wakefulness and orthodox sleep both increase and as an adult, a cat behaves like a man, dreaming about twenty per cent of its life away.

I do not hesitate to equate the rapid eye movement sleep in animals with dreaming. Pet owners have always believed that the sniffing, whining, flapping, sucking and wagging that go on in some phases of sleep in cats or dogs, were signs of dreaming. There is every reason to believe that this is true. It would seem to be impossible to ask an animal to tell us whether or not it dreams, but Charles Vaughan at the University of Pittsburgh has done just that.[275] Like most of the best discoveries, this one was accidental and occurred during an experiment designed to test the rhesus monkey's reaction to sensory deprivation. The monkeys were placed in a chair in a modified telephone booth and given an electric shock every time they did not press a bar very rapidly after an image appeared on the screen in front of them. A huge variety of slides were projected and the monkeys proved to be very reliable, pressing the bar without error as often as three thousand times an hour. Then Vaughan turned on a uniform waterfall sound, fitted the monkeys with opaque contact lenses and shut the booth off completely from all outside stimulation. He hoped that in these monotonous conditions the monkeys would suffer, as humans do, from hallucinations and that when they saw visions, they would respond by pressing

the bar. Unfortunately, the monkeys responded to the monotony exactly like humans– and fell asleep. Then came the bonus discovery. As soon as the monkey's eyes began making rapid darting movements in their sleep, they started pressing the bar. They were seeing things in their sleep and all of them continued for many minutes, breathing deeply, flaring their nostrils, making faces and noises as they pounded away at the bar. The same kind of experiment is now being repeated with rats, cats and dogs and work is under way to design systems with numbers of bars which have to be pressed for different objects, so that the animals can tell us what it is that they have been dreaming about.

Paradoxical sleep occurs only in warm-blooded vertebrates. Fish and reptiles certainly sleep, but always in the light orthodox way. On an evolutionary scale, dream sleep patterns first appear among birds. Only pigeons and chickens have so far been extensively tested and both species produced very brief bursts of paradoxical sleep, lasting no longer than fifteen seconds at a time.[134] The dream state occupies less than one per cent of their lives, but when it does appear, it follows the usual mammalian pattern. Every mammal ever tested has proved to spend at least part of its sleep periods in the dream state. In this condition, the muscles of the body are more relaxed than in orthodox sleep, so it is no surprise to discover that predators can afford to dream more often and more easily than their prey. Dream sleep is obviously concerned mainly with the brain and it cannot be purely coincidental that it should also occur for longer periods in species such as cats, raccoons, monkeys and men that have higher levels of consciousness and intelligence than sheep or rabbits. It seems likely that dreams have a great deal to do with the development and the integration of consciousness.

One theory of dreaming suggests that it might help assimilate the events of the day by re-running some of them and comparing these with previous experience before filing the whole lot away in the memory banks. The build-up of dream debt is nicely accounted for in this theory as an accumulation of unsorted experience in the cortex. We certainly have two types of memory; a short-term pattern that makes it possible to hold a

telephone number in your head long enough to dial it, and long-term memory that is capable of fixing it there permanently. Suspicion is growing that the hippocampus—an antler-like protrusion beneath the brain—is the area involved in transferring relevant parts of recent experience from temporary holding areas to wherever it is that we house our long-term stores. This structure functions all the time, but it produces a particularly strong beat in juvenile mammals and in all individuals during dreaming.

There was a perfect little experiment done some years ago with hamsters, which demonstrates the fact that a certain period of time is necessary for fixing memories.[89] Hamsters were run daily through a complex maze and given an electric shock afterwards. When the shock was given four hours or more after the run, it had no effect on the learning curve. A shock one hour after the run impaired learning a little, and a shock one minute after the test destroyed long-term learning completely. Hamsters shocked too soon after their lesson had to start each day in the maze from scratch. The short-term memory pattern seems to be an electrical one that can be destroyed by another electrical stimulus so that it is never converted into a long-term form; but the long memory is almost impossible to disturb in any way. Alcoholics often cannot remember what they were doing two hours ago, but are ever ready to regale a captive audience with the most detailed accounts of things that happened in their childhood. Similarly, if hamsters that have learned the maze are chilled until all electrical activity in the brain has disappeared, and then allowed to recover, they remember every twist and turn. After freezing for surgical purposes, human memory is similarly unimpaired, but if the hippocampus is damaged, no new long-term memories will be formed.

Epileptic patients are sometimes treated by surgically removing the entire temporal lobe.[212] After the operation (which destroys the hippocampus), their IQ levels remain the same, they remember their past, their profession and their relatives, but they cannot hold new information for more than a short while. Articles may be read and understood, then completely

forgotten; the death of a relative causes grief, but an hour later the news is lost and, if asked about the person in question, the patient will say that he was fine last time they had word of him. Without a hippocampus there are no fits it is true, but neither are there any new memories nor any dreams. Once again we find a connection between the brain storms of epilepsy and dreaming and this time there seems to be a clear functional relationship. We need now to know only one thing more—and that is where memory storage takes place.

Theories about memory are polarized like the philosopher's question about rivers. "Is a river the water flowing in it, or the channel cut by the water?" The fact that activity in the brain can be brought to a standstill without affecting the memory, suggests that the river can dry up without losing its identity and that those who favour the channel theory might be closer to the truth. Muscle fibres react to exercise by becoming darker, but there is no comparable change in nerve or brain cells following activity. Changes in the structure and distribution of nucleic acids in nerve cells following learning have been reported in flatworms[194] and in rats.[126] Injection of these altered molecules into other naïve animals is even said to transfer this learning, but arguments still rage about the validity of these experiments and it seems unlikely that memory can be stored on a long-term basis by means of chemical changes like these.[6] One of the main stumbling blocks to any theory that relies only on a static change in a particular nerve cell, is the difficulty of explaining why this localized memory is not altered by extensive brain damage.

When the exposed brain of a person undergoing surgery with a local anaesthetic is stimulated electrically, various specific things happen, but most of these are related to immediate responses and have little to do with past experience or memory. Huge sections of the brain can be destroyed without the loss of any particular memories. There are records of brains extensively damaged by trauma, by tumours, by loss of circulation, by injury and old age. They may lose the ability to make judgements or learn new things, they may lose physical sensation or become profoundly psychologically disturbed, but the memory of past experience usually remains intact. Prefrontal

leucotomy, which involves separating the frontal lobes from the rest of the brain, helps obsessive or delusional patients relax but has no effect on their memories. Anterior cingulectomy, the removal of parts of the cortex, makes neurotics less inhibited without altering their recall of the past. There seems to be absolutely no evidence to suggest that memories are stored in any special part of the brain—or anywhere else in the body.

This leaves us in the following position: We know that personality grows from a biological base, but depends on individual experience. We know that this experience is stored as memory and can be drawn on in dreaming to allow the personality full and independent expression. We know that all mammals are capable of this kind of expression, but in none of them can we find any physical trace of such a memory bank. Therefore, there is at the moment no valid biological objection to the suggestion that personality, in the form of an individual set of memories, could survive beyond the point of clinical death.

This suggestion, and at the moment it is only that, makes it necessary to assume some kind of dualism. We can make sense of the idea of survival only if we presume that every organism capable of survival after death is an intimate compound of at least two separate constituents. One being the ordinary everyday body and the others something of a very different kind, not normally open to ordinary observation. This is by no means a new idea. In the fourth century BC, Plato held that all matter had its corresponding form in the world of ideas.[78] René Descartes, two thousand years later, looked at dreams and concluded that "the same thing, perhaps, might occur, if I had not a body at all".[62] He nevertheless felt that there was some connection and suggested that the soul was situated on the pineal body, that tiny protrusion from the brain that has evolved from a primitive third eye.

The assumption of a second system intimately associated with the normal body, does provide answers for all kinds of problems that we have left hanging without solution. The organizer that produces the directional patterns of life and death, and separates these from goth, could be located here. Information acquired by the physical body or the somatic

system could be stored as integral parts of this organizer and provide a base for memory and recall. If such a fellow traveller does exist, I think it is necessary to assume that it does have some physical reality and is not unlocated like some cosmic vapour. To be at all useful as an answer to biological problems, it would need to be so closely associated with the normal somatic system that any change in one would more or less immediately be mirrored in the other. It need not follow the shape and pattern of the body in detail, but might bear the same relationship to it that an electromagnetic field does to the conductor which lies at its centre.

The complexity of dream experience suggests that the second system is capable of creating a personality complete with traces of experience, habits and skills, organized in a way that is typical of that individual; but we have no grounds to assume at this stage that it can do this without a body. To use another electrical analogy, music that has been transmitted from a radio station exists as patterns of modulation in the air, but these cannot be recreated without a receiver suitably tuned to the correct wavelength. When the transmitter is destroyed by saboteurs, the transmission continues to exist in space for a short while until it eventually attenuates and completely disappears. Our speculation about the survival of physiological sabotage in the form of clinical death, centres on the duration of this period of disintegration. If there is a second system, and if it can survive without the first, I suspect that it cannot do so indefinitely.

I have used the dream experience as an example of the way in which personality does seem to enjoy some kind of independence. The state of the body during dreaming is so strange and at such variance with all other normal experience, that it could be associated in some way with the second system. The fact that dreaming fills most of a baby's time and that it occupies an even greater percentage of the sleep of a premature baby, suggests that it might be the paramount activity of a child still in the womb. This flurry of dream activity during the most critical stages of the development of the brain, could be the mechanism which first forges the bond between the two systems. It might

even create the second system. Dreaming in later life could be the expression of a need to maintain the connection between the systems. The fact that dream deprivation causes dissociation and loss of memory and can even precipitate epileptic convulsions, is a measure of the strength of this need.

At this stage, all such suggestions are purely speculative. All we have established so far is that there are good reasons to presume that an alternative or supplement to our somatic system could serve a useful evolutionary purpose; and that there is nothing in biology to suggest that such a system would be impossible, or does not exist.

Chapter Five

ENLIGHTENMENT as a biological process

You can break the sound barrier without even moving your feet. It works like this, in three stages. First you breathe in quickly; then you hold the air for a moment while you raise your tongue to block the mouth so that pressure builds up in the lungs, until it is released suddenly and explosively in a two-level blast that initially bypasses the barrier by rushing out through the nasopharynx; then forces the tongue down to shoot out through the mouth. Each stage has a characteristic sound, and together the "ah", the "tish" and the "shoo", of course make up one sneeze. In the "tish" stage, air and suspended droplets are expelled through the nose at supersonic speeds of up to four hundred metres per second. Any internal attempt to stifle this violent rush can damage the nasal membranes so badly that they bleed, but every day we run this risk, apparently merely for the sake of politeness.

There is more to the sneeze than meets the ear. Our custom of holding a hand or a handkerchief up to the face while sneezing obviously has survival value, it limits the spread of influenza, measles and the common cold, but why should each sneeze be followed by an automatic chorus of mutual social blessings? Our conditioned reflex could date back to the time of the great plagues, when a sneeze was often the first sign of imminent death, but the custom of making some talismanic comment about each little personal explosion goes back further than that. There is an almost world wide belief that a sneeze either bares

the soul or that it actually involves the loss of part of the soul matter.

This kind of concern can grow in the way that many superstitions do, by the accidental association of two totally unrelated circumstances. The behaviourist B. F. Skinner once wrote an erudite paper on superstition in the pigeon.[246] In it he describes an experiment in which pigeons were placed in a cage and presented with food at predetermined intervals. It was left entirely to chance to determine what particular activity was in progress when the food appeared. One bird happened to turn its head counter-clockwise at the crucial moment and another happened to peck at a certain spot on the wall. These responses were reinforced by the arrival of the food and were later repeated more often than other random responses, which of course ensured that they would be more often rewarded. So a rapid spiral of association between the circumstances arose and led to the development of a ritual dance and an equally formalized tattoo in the two pigeons, each behaving as though there were a direct causal connection between its behaviour and the presentation of the food.

Accidental connections of this kind do sometimes lead to strange human beliefs, such as that of the child who continues to touch trees in the park in a certain special sequence because the first time he did so he found a silver coin, but these are seldom long-lasting. When there is no further reinforcement, a response decreases in frequency and eventually becomes extinct. The association of the sneeze with the soul is in a different category. The sneeze can be compared with the behaviour of the pigeon, but what corresponds to the arrival of the food? A belief that something else has happened, is not a sufficiently strong reinforcement to account for the survival of this superstition for so long. There must be another circumstance, something that actually does happen when we sneeze.

Sneezing can occur as a symptom of an infection or when the membranes in the nose are irritated by cold, dust or an allergic reaction, but there is one situation in which the response is triggered in a more indirect way. An enormous number of people sneeze violently when exposed to bright light. Eyes water

in the light and tears flow down into the nasal cavity and could cause sneezing, but the response to light is too rapid for this to be the explanation. The African Azande people believe that a random sneeze means that someone is speaking well of them, but two in succession mean that something evil has been said.[72] Now that Douglas Dean has shown that there are measurable physiological changes taking place in the body of someone who is being thought about, even at a distance, the old wives' tales about ears "burning" at these times no longer sound quite so ridiculous.[59] It might not be true that "left it's your lover and right it's your mother" thinking about you, but there is every reason to believe that there are direct physical accompaniments to certain mental processes.[110] The Azande may well be right in thinking that the strongly aggressive thought makes them sneeze more often than the mellow kind one.

The connection between sneezing and both light and emotion is a tenuous one, but it suggests that the phenomenon may be governed by the only part of the brain that deals in both these commodities. This is the pineal body.

Descartes was not the first to pick this spot as the site of the soul. Three thousand five hundred years ago, when Vedic literature first appeared, it contained the suggestion that the highest source of power in the body lay in the space between the eyebrows.[4] The ancient Hindus based this belief on a fact which Western anatomists only discovered for themselves in 1886. In that year two independent monographs appeared, one in German and the other in English, each pointing out that the pineal body was in reality a third eye, and had evolved from the central light-sensitive spot that can still be seen in primitive reptiles such as the famous *tuatara* of New Zealand.[270] In this lizard-like animal the pineal apparatus consists of a small cavity, the outer layer of which has become a lens, and the inner layer a retina connected by nerves to the brain through a gap in the skull. The skin covering the area in which it lies is thin and translucent. In the *tuatara* and many fish, birds and small mammals, the pineal sits on top of the head; but in higher primates and humans the cerebrum has grown over the brain and the pineal body now lies half-concealed in the centre

of the skull. If we still retained the layer of translucent skin, it would appear a little above and between our eyes—right where the Eye of Enlightenment is shown in Hindu art.

Until about fifteen years ago, our pineal was thought to be a useless vestigial appendage, something left over from reptilian times. Then in 1959, Aaron Lerner of Yale University discovered that it produced a hormone which he called melatonin, and the pineal changed its image from degenerate body to renascent gland.[160] Interest in the pineal revived and a year later it became clear that melatonin was manufactured from serotonin, a very stange substance that occurs in the most unlikely places.[6] It is found in dates and bananas and plums, but nowhere is it more common than in a species of wild fig that grows in the tropics into huge sprawling trees with hanging roots that prop their branches up in beautiful shady colonnades. In Africa these *banyan* trees are sacred to many people and are very seldom cut. In India they are known as *bo*, and it is said that it was beneath one of these trees that the prince Siddhartha Gautama sat (eating the figs?), when he suddenly understood the causes of human suffering. It was this enlightenment that led to his being called the Buddha.

The molecule of serotonin is remarkably similar to that of a substance first extracted from rye grain infected with the parasitic ergot fungus and now synthesized as lysergic acid diethylamide or LSD. Despite the mass of work done on this famous substance, we still have no clear idea of how it works on the brain. The most likely hypothesis is that LSD is antagonistic to serotonin and alters its concentration in certain brain cells and that it is this change which produces dramatic alterations in perception and understanding. LSD is often totally unpredictable in that, as Aldous Huxley pointed out, it can be either heaven or hell depending on the circumstances. The drug seems to have few direct effects of its own, but it triggers a mental explosion and the direction of the blast is determined by other factors. It can undoubtedly produce visionary states as real and as productive as those enjoyed by any great mystic. Huxley said it would be senseless "for an aspiring mystic to revert, in the present state of knowledge, to prolonged fasting and violent

self-flagellation" when he could "turn for technical help to the specialists".[125] Perhaps all enlightenment depends on the activity of serotonin and the pineal gland, and the combination of factors providing the correct stimulus to this system can be discovered in any of a number of ways.

The word "enlightenment" is an interesting one in this respect, because light seems to play a large part in transcendence. Visual hallucinations are the most characteristic aspect of the LSD state, and in several studies it has been discovered that the retinal cells are reacting entirely on their own.[50] Without the stimulus of special light waves, they send signals off to the brain about a whole galaxy of wavelengths and frequencies that apparently do not exist at that time and place at all. The brain "sees" these lights and colours as it sees the images in a dream, it feeds itself with information. In experiences induced by faith or fasting or any other method of producing enlightenment, the effects are the same.[117] They are called visionary states because the sense of sight is paramount. Common to nearly all of the experiences is the sensation of a sudden, dazzling, brilliant light, an unearthly radiance. It happened to the prophet Ezekiel, and to Paul on the road to Damascus, and it forms the basis of the ecstatic state of Kundalini Yoga in which the light is described as "lustrous as ten million suns".[21]

The Yogis believe that life is powered by a snake-like coil of energy that travels through the body along a line marked by vital centres or *chakras*. Most of these are associated with special organs, but one of the highest is connected with the mind and is said to be situated in the space between the eyebrows. This seems to be the pineal gland and in its evolutionary origins as an eye, we have a biological basis for the emphasis on light in states of transcendence.[66] Meditation, say the Yogis, is "lovely shiningness". From the new biochemical studies of the brain and its hormones we learn that this same light-sensitive pineal gland also produces a substance that profoundly alters the function of the mind.[353] It produces ecstasy. In visionary states, in the fugues of schizophrenia, at times when the mind is affected by hallucinogenic drugs, the pineal could be directly involved. Common to all these conditions is a sense of detachment in which

consciousness is removed to a point outside personal experience, where the division between self and non-self ceases to exist and the world becomes seamless. The word ecstasy is derived from a Greek one that means literally "to stand outside", and it seems likely that, if there is any biological possibility that the personality or mind or soul or second system can be separated from the body, then the pineal will be the point of detachment. In the light of evidence already available, it becomes more and more difficult to deny that such a separation could take place.

We began this flight of fancy with a sneeze and, by adding just one more link to the chain, we end up right back where we started.

The vital energy that co-ordinates the molecules of a living organism and hooks them together into a patterned and functional whole, is identified in Hindu writings as *prana*. It is described as something which is neither a product of life, nor anything as simple as oxygen or any inorganic element available in nature—and yet it is somehow assimilated into the body by breathing and eating. It is said that the best way to replenish *prana* rapidly is by the exercise of *pranayama*, which is the voluntary control of the three acts of inbreathing, holding the breath and outbreathing in a special rhythm. The "breath of life" has a rhythm of 1:4:2, while the destructive sneeze, as near as I can tell from timing those taking place around me, is much closer to 18:1:2.

This notion of a universal life-breath substance is a nice one, providing a theoretical basis for the suggestion that life is patterned by a biological organizer, but it is based on a mystical tradition that is not available for scientific analysis. There is, however, a recent development in pure technology that seems to provide hard evidence for the existence of something like *prana*. Dennis Milner at the University of Birmingham has produced an instrument for taking photographs without light.[183] He uses film sensitive to electrical discharge rather than light waves, and sends a single pulse of direct current through the object to be photographed in a dark space between two glass plates. While still developing his apparatus, Milner checked it out and found that he was getting pictures even when there was no

object in the test chamber. With nothing under the camera but clean dry air, he was able to produce pictures of pulsating globules of energy in the midst of a delicate tracery of glowing threads that look like the patterns produced by dancing fireflies on a time exposure.

These results have been criticized on the grounds that the effects may be due merely to what is known as "the streamer phenomena of corona discharge".[167] What this means is that patterns like these are produced when air is ionized as a current flows through it.[24] Milner felt certain that he had guarded against this possibility and to prove that ionic processes had nothing to do with the production of his pictures, he modified his apparatus to work in a vacuum. With no air in the test chamber, the same characteristic patterns still appeared on the plates.

At higher magnifications, Milner's pictures are even more interesting. The patterns seem to be of two basic forms. One is a radiating structure of force lines that centre on little glowing cores, but spider out in regular radial feelers to connect up with adjacent cores in a regular almost mathematical pattern, like the skeletal filaments on a head of brain coral. The other form is based on spheres and agglomerations of spheres in circular patterns, like a field of round-petalled flowers almost touching one another. These simple basic shapes could be combined and elaborated into almost any form found in nature, and it may be that Milner has succeeded in registering for the first time the field force which is responsible at a basic level for all form and function.

Mystics have always claimed that there are forces working invisibly all the time in nature to produce the variety of forms that we observe, and that these continue to flow through and maintain a body as *prana*. This energy is thought to be chanelled in its passage through the body along lines of force that are marked by the focal points of the *chakras*.

To those with special awareness the *chakras* are said to look like shining wheels of light that rotate rapidly in a counter-clockwise direction. In a newborn baby, they are just one centimetre in diameter, but in an enlightened adult they may grow

to be discs fifteen centimetres wide. In people of all ages, these glowing vortices are said to lie right on the surface of the body and their exact locations, even when reported by naïve observers, are remarkably consistent. I have questioned a child on a remote Indonesian island, who was said to have special powers but who lived in a community where nobody knew anything of the classic theories of yoga; and she explained what people looked like to her and pointed to the precise traditional locations of the *chakras*, which she described as "fires". The lowest lies around the base of the spine, the others near the navel, between the spleen and the kidneys, over the heart, on the throat, and the highest one sits between the eyebrows.

We have already suggested a connection between the highest *chakra* and the pineal gland, so it is worth noting that the reported positions of the other centres also correspond with the locations of important hormone-producers. The ovary and the testes lie near the end of the spine and the navel, the adrenals above the kidneys, the thymus over the heart and the thyroid on the throat. All these glands control and regulate bodily processes, but there is no circulatory system, nerve net or pattern of lymph vessels that connects these points directly together. For this reason, Western medicine has tended to dismiss the possibility of the *chakras* having any physical reality; but there is a system of healing in oriental medicine that correlates perfectly with the *prana* pattern.

Acupuncture presupposes the existence of twelve main channels or meridians in the body through which energy flows. In five thousand years of practice, acupuncturists have painstakingly plotted the positions of these lines of force, and literally pinpointed more than seven hundred spots on the surface of the body where these channels come close enough to the skin to be manipulated. The meridians follow no known physiological pattern, but they seem to be nonetheless very real. Yoshio Nagahama of Chiba University in Japan found a patient who had been struck by lightning and left with an unusual sensitivity.

He was a peasant farmer, a man from the mountains who had received no formal education and had absolutely no knowledge

of acupuncture. Yet, when pricked with a needle in one of the fundamental points of a meridian, he was able to trace with his finger a line over his body along which he felt an "echo" of the sensation.[200] In every case, these lines followed the traditional meridians precisely.

In the nineteenth century a German doctor, who knew nothing of acupuncture, discovered a system of skin points which he thought were associated with homeopathic remedies.[127] When his points were later compared with those on an acupuncture chart, most of them coincided. In Korea earlier this century, Kim Bong Han developed a machine capable of measuring small differences in the resistance on the skin.[227] Places where sharp gradients occurred, once again proved to be the acupuncture points. At an electronic institute in Leningrad, a device called a "tobiscope" has been perfected which monitors plasma-like flares on the skin, and is capable of locating acupuncture points with an accuracy of less than one-tenth of a millimetre.[208] These developments attest to the reality of the classic meridians and make it possible for almost anyone to find the elusive spots without having to go through the long and exhaustive training of the traditional acupuncturist.

Hiroshi Motoyama at the Institute of Religious Psychology in Tokyo has just completed a project in which he worked with one hundred practising members of a yoga group.[190] He found that they could all produce unusual fluctuating rhythms on a blood pressure sensor which had nothing to do with the normal rhythm of the pulse. Mapping the paths of the new rhythms with the sensors, while his yoga adepts were deliberately stimulating the various traditional *chakras*, Motoyama has discovered that these centres all lie in acupuncture meridians. Some cut through as many as four *chakras*, and all the lines connecting the yogic focal points are precisely those laid down, both by students of acupuncture and by the new machines that support them.

It seems that the life force described as *prana* in yoga and *ki* in acupuncture, is exactly the same thing. There are fringe fields of medicine in the West; such as homeopathy, naturopathy and osteopathy; which have long held a similar view—that health

depends on the maintenance of a balance in the body which allows the life force to do its own healing. Only the most dedicated allopaths, those mainstream medical practitioners who believe that disease must be treated by combative drugs, still deny that the body can do a great deal to treat itself if given the right assistance. By concerning themselves only with the working parts, they begin to look like radio repairmen who have never heard the receiver in action. Music and life need two further stimulants; power provided by food and air, and information provided by the appropriate radio waves. *Prana* is our equivalent of the airborne patterns that allow disembodied music from a distant source to be recreated in a million other places. The life force suggested by this theory is as insubstantial as ether and yet essential to the ordered patterning of matter that produces a functional living organism. It is not something to be sneezed at or out.

It is now very difficult to deny that we could each of us be carrying a hidden second system, a *doppelganger* that complements our more familiar somatic systems. Evidence in favour of its existence accumulates all the time, but we have yet to prove that this etheric double, this electrical wraith, could survive the disorganization of body matter and continue to exist after clinical death.

People who have had a limb amputated, sometimes have the feeling that not only is the missing piece still present, but that it is also painful. The ache in a lost arm can be very real and is known as referred pain. This is something familiar to all of us—a bump on the inner elbow often causes pain in the little finger, which has not been touched. This happens because the pain is neither in the elbow nor the finger. Pain is an awareness in the brain, in this case of a signal that has reached it by a particular nervous pathway. The route from the elbow is via the ulnar nerve which runs from the little finger up the inner side of the arm and via the spinal cord to the brain. All the brain knows about it is that the impulse originated somewhere on this pathway and, from force of habit, it always interprets this signal as an insult to the little finger. It would continue to do so even if the finger had been amputated.

Not all phantom limbs are this easily explained away. The pain in some can, however, be banished by direct suggestion under hypnosis. If someone with an intact arm is told by the hypnotist that the hand has been anaesthetized, then tests with a pin will always show that the upper limits of the dead area have an artificially sharp edge, like the top of a glove.[20] If anesthesia followed the anatomical distribution of cutaneous nerves in the skin, the edge of the area would be very uneven, but it never is. So the lack of sensation takes place, not in any natural area defined by the nerve ends in the brain, but in a totally artificial area designated by the mind as "the hand". If the pain in a missing hand was due only to being referred, then hypnosis should have no effect at all because, according to the theory the brain does not know that the pain comes from some place other than the missing hand. But it does work, and measurements show that the anaesthetic glove is there, sometimes extending up on to the forearm, just as though the limb were still intact. Perhaps in a sense it is.

At Kirkov State University in Kazakhstan, photographs are being taken with a machine that generates high-frequency fields between two electrodes.[208] If a leaf is placed in the test chamber, the picture shows the entire leaf in outline filled with pinpoints of radiance like a close-up of the Milky Way. These patterns change the whole time in a living leaf and, as it dies, gradually fade away until they disappear altogether. Victor Adamenko has found that if a piece is cut from a fresh leaf immediately before its electrical photograph is taken, the picture still shows the entire leaf, with the ribs and veins and margin of the missing part faintly outlined in a lesser radiance, like a botanical ghost. The Russian workers believe that this phantom limb of the leaf remains visible because of a persistent energy field that they call bioplasma, which sounds like a very suitable scientific pseudonym for *prana*.

I must add that only one worker in the West (H. G. Andrade of Brazil) has so far been able to reproduce this effect of the leaf ghost. Adamenko himself, who has come in for professional ridicule over this experiment, is inclined now to pass it off under pressure as an aberration of some kind—perhaps a double

exposure, but I get the impression that he does not really believe this. I have the feeling that apparatus will be perfected in the next few years that will make it possible to demonstrate the phenomenon regularly and with many other forms of life. It fits so well with so many other isolated findings that I do not think we can afford just to dismiss it out of hand.

Psychic and sensitive people often claim that they can still see the outline of an amputated limb, sometimes clearly enough to describe its peculiarities in detail.[130] If they can, and if the Russians are right, then it seems that the life force which is so intimately connected with a living organism, can survive in its original form, at least temporarily, despite the loss of some of its parts.

Our ultimate aim in this portion of the argument is to investigate the biological possibility of the total separation in time of the somatic and the second systems, but it could help us to look at this realistically if we first examine the possibility of their separation in space. If the two systems can exist independently at the same time, then the chances of their being able to do so at different times are greatly increased.

The Institute of Psychophysical Research in Oxford has for some time now been collecting reports on what they call lucid and pre-lucid dreams.[196] A lucid dream is one in which the subject is aware of dreaming. In a pre-lucid dream, the subject wonders whether a dream is taking place and may or may not come to the correct conclusion. This is one from the Institute's files:

"I now found myself with X (a minister friend) in a room at the other end of the corridor. I was telling him about the lucid dreams I had just had, and said suddenly as it occurred to me, 'And of course this is a dream now'. X said with an unhelpful smile, 'Well, it might be. How do you know?' 'Of course it is', I said and crossed to the window. 'I am going to fly,' I said. 'Be awkward if it is not a dream, won't it?' said X, who continued to stand by passively, looking humorous."[196]

It is logically possible to dream about anything at all, including the experience of waking from a dream. Many people do

this, seeming to wake, finding themselves in bed, getting up and starting to dress, then suddenly realizing that it is all a dream and that they are still asleep. Even recognizing that this awakening has been false, does not make the next one real. Bertrand Russell said that he once had "about a hundred" false awakenings as he recovered from an anaesthetic.[228] The problem of distinguishing waking from dreaming, at least while still in the dream, seems to be considerable. Pre-lucid dreamers cannot rely on the quality of their sensations as a guide, because the experiences of touch, taste and smell in a dream can be convincingly real. Any sensation that one can have in waking life, one can have in a dream. Experiences can be linked in a coherent and meaningful way and related to past experience. A dreamer can dream of waking, of getting up, of going out and doing a whole succession of everyday things, all perfectly ordinary until the point is reached where the reality of the experience is questioned. At this moment, the dreamer can even remember the problems that other people have had in similar dilemmas and compare their experience with his own—and still not be certain of his state.

You can even read a book in a dream and think it real. Are you awake now? Or is everything that has happened to you today all part of a complex dream? For a moment, questions of this kind can produce a twinge of doubt, but soon you discard the fantasy because you *know* that you are awake. This certainty is something that we feel at a biological level so basic that it has nothing to do with reason. One of the subjects of the Oxford Institute expresses this feeling very well: "I wondered how shall I know when I am really awake? It has often puzzled me; but somehow I feel certain that there is a different feeling when one is really awake. I have not been able to definitely pinpoint the difference. Somehow there seems to be one of the senses missing when one is dreaming—possibly a sense of 'responsibility'."[196] So if you find yourself in any doubt about being truly awake, then you can be certain that you are asleep.

This certainty turns a pre-lucid dream into a lucid one and brings with it another kind of certainty. In the lucid dream state, the subject is in no doubt at all about the dream. There

seems to be a quality to dreaming that is as specific and as elusive as the reality of being awake. Despite the similarity between the sensory experiences and the intellectual processes that take place in waking and dreaming, there is good reason to assume that the two states are totally distinct and that personality can express itself equally easily in either, but not in both at the same time. When you are awake, you can remember how wonderful it felt to launch your body from a dream window and to soar effortlessly over the tiled roofs of the village below. When you are dreaming lucidly, you can remember how terrible it felt to cut your finger on a sharp razor—and perhaps even try the experiment of doing it deliberately in the dream to compare the two sensations. Personality growth probably depends on both kinds of experience. In waking life we are exposed to forces that shape our bodies and the minds they bear; in dream life, as in play, we have the opportunity to act out the effect of these forces in a variety of circumstances, to relate them to our other experience and to build a comprehensive and functional attitude to life.

The fact that babies spend eighty per cent of their sleep time in dreaming and that this proportion declines to less than fifteen per cent in aged people, supports this idea that the dream state is important for the integration of experience. It seems that almost all the content of dreams derives from sensations collected while awake. Helen Keller, who was deprived of sight, sound and smell by an attack of scarlet fever soon after birth, dreamed a great deal. At first these were purely physical and undeveloped experiences such as having something heavy fall on her. Later, when she was put in the hands of a skilled tutor who began to describe the world to her in detail, she started to dream in new dimensions, but all these were firmly grounded in her only reliable sensation, that of touch. "Once in my dream I held in my hand a pearl. I have no memory vision of a real pearl. The one I saw in my dream must, therefore, have been a creation of my imagination. It was a smooth exquisitely moulded crystal . . . dew and fire, the velvety green of moss, the soft whiteness of lilies."[144]

The congenitally blind dream without vision or the rapid eye

movements so characteristic of the dream state in sighted people.[19] One blind and deaf patient had never heard of the concept of a dream when questioned by an interpreter, but remembered once waking in inconsolable sorrow having re-experienced the shock of reaching into a pet bird's cage and finding its lifeless body.[207] This relationship of waking sensation with dream experience is skilfully demonstrated by an observation made on a sleeping deaf and mute man who normally communicated by sign language with his hands.[178] When he dreamed of talking normally with other people, an electromyograph attached to his sleeping body showed strong action currents being produced, not in his larynx, but in his fingers.

The dependence of dreams on the information acquired while awake is enormous, but it is not total. In 1965 an Australian study showed that it was possible for people sleeping under heavy sedation to learn to discriminate between two tones, one of which was accompanied by an electric shock.[16] When the same two tones were played to the subjects after they awoke, an electroencephalograph showed that their brains responded to the shock tone and not to the neutral sound. This conditioning falls a long way short of the claims made for sleep-learning by those who sell the necessary apparatus. Most studies indicate that learning is largely confined to those periods when the potential student is drowsy and on the verge of sleep, but there does seem to be a difference in responsiveness between the different kinds of sleep.[247]

As we fall asleep, we pass through four recognizable stages of orthodox sleep in which we become progressively more difficult to awaken. Then, when rapid eye movements begin and we go into paradoxical dream sleep, there is a sudden quantitative change. Muscle tone falls rapidly and the body becomes limp; spinal reflexes disappear and even snoring ceases. As brain activity increases, receptivity decreases.[49] The most complete physical withdrawal seems to occur in dreams that become lucid. The lucid dreamer is almost impossible to arouse and there is not a single record of a lucid dream that incorporates external stimuli in the way that non-lucid dreams often will. It seems that when you know you are dreaming, you have

achieved an almost total withdrawal from the confines of the body.

There are countless anecdotes of dreams in which the subjects seem to have been able to acquire information otherwise not available to them. At the Maimonides Dream Laboratory in New York, Montague Ullman and Stanley Krippner have been trying to analyse this possibility objectively.[96] They attach their subjects to the usual electroencephalographic apparatus and, after each period of rapid eye movement, wake them and ask about the dream they have just had. While this is going on, a third person in a room at the other end of the building concentrates all night on a painting chosen at random from a large collection. In the morning, the dreamer is shown a selection of pictures and asked which one most closely matches his dreams. There have been many striking correlations. On one night the target painting was "Zapatistas" by Orozco, showing a group of Mexican revolutionaries on the move against a dark background of swirling clouds and mountains. The subject dreamed of "New Mexico", "heavy clouds and mountains" and "a colossal film production". Even when the relationship between dream and painting is less obvious, a panel of independent judges seldom have any difficulty in choosing the correct picture from a series, purely on the basis of the recorded dream reports.

This success could be construed as evidence of telepathy rather than of a detachment of the dreamer from the site of sleep, but more recent work at the same laboratory sheds a new light on the problem. In 1969, Malcolm Bessent, a young British psychic, joined the group and dreamed of "a bowl of fruit" when the target was Cokovsky's still life "Fruits and Flowers"; and of "shallow pools" and of "making a collage" when the target picture was a collage called "People Soup".[96] What made these hits on the target particularly exciting was that there was nobody in the third room thinking about the paintings and that, on several occasions, the painting was not even selected until the following morning. Bessent seems in his dreams to be able not only to travel to a different place than that occupied by his sleeping body, but also to achieve a separa-

tion in time. It would be most interesting to know how many of his dreams were lucid, because this dissociation can apparently be controlled at will when you realize that you are dreaming. One of the subjects working with the Oxford Institute of Psychophysical Research reports that in a lucid dream it is possible to move to any environment simply by "closing one's eyes and concentrating imaginatively."[198]

There is one old, but well-documented, case which illustrates all the possibilities inherent in this situation.[245] On 3 October 1863, the steamship "City of Limerick" sailed from Liverpool with S. R. Wilmot, a manufacturer from Connecticut, on board on his way home to his wife and family in the United States. On the night of 13 October, Wilmot dreamed that his wife came to his cabin clad only in her nightdress, paused at the door when she discovered that there was another occupant, then advanced to his side, stooped down to kiss him and after a short while, withdrew. In the morning the other occupant of the cabin, who is described as "a sedate and very religious man", was angry with Wilmot for no apparent reason. When pressed for an explanation, William Tait exclaimed, "You're a pretty fellow, to have a lady come and visit you in that way." It transpired that, while lying wide awake in his berth, he had witnessed a scene corresponding exactly to what Wilmot had dreamed. When the ship arrived in New York on 23 October, one of the first things Wilmot's wife asked him was whether he had received a visit from her ten days previously. Knowing of the stormy conditions in the Atlantic, and having heard reports of the wreck of another ship that left Liverpool at the same time, she had gone to bed on that night feeling very anxious for her husband's safety. During the night she felt that she had crossed a wild sea; found a low black steamer; passed through it until she came to her husband's cabin; saw a man in the other berth looking straight at her and was for a moment afraid to go in; but did anyway and kissed him on the forehead before leaving. When questioned she was able to describe the unusual layout of the cabin precisely.

This case was followed up by the officers of the American Society for Psychical Research and there seems no reason to

doubt the testimonies of those involved, but it is impossible to pass judgement on it over a century later. The value of the story now, lies in the possibilities it suggests. If everything happened just as reported, then Wilmot and his wife shared a dream experience, but continued in it to maintain their own identities, seeing and feeling what they would have done had they been carrying out the actions in normal waking life. The fascinating part however is the fact that Tait, who was wide awake, also took part in the same incident from his point of view. The fact that he seems to have seen, and could later describe, Wilmot's wife suggests that the energy body we postulated earlier might continue to keep a typical and recognizable shape while detached from its physical counterpart.

And suddenly we are in at the deep end of that murky world of phantasms where science has little chance of keeping its head above the vapour and confusion. I regret this. From what I have seen of the area, I believe that out-of-the-body experiences are an objective reality and could become amenable to analysis, but the quest for information is bedevilled by the nature of the evidence itself, which is necessarily circumstantial.

I can even add to the confusion myself. While travelling with a safari group in Kenya, my vehicle skidded and overturned on a dusty bush track. It rolled over twice before coming to rest, poised precariously on the edge of a dry storm water gully. I found myself standing outside the small bus, looking at the head and shoulders of a young boy in the party who had been pushed halfway through the canvas roof on the last roll and would be crushed if the vehicle fell any further—as it seemed bound to do. Then, without pause, I recovered consciousness in the front seat of the bus, rubbed the red dust out of my eyes, climbed through the window and went round to help the boy free himself before the battered vehicle settled itself into its final resting position. My memory of the details "seen" while still unconscious is very vivid and there is no doubt in my own mind that my vantage point at that moment was detached from my body; but even a personal experience of this kind remains remote from any tangible scientific explanation.

The problem remains to be resolved and I think that the only

hope of a solution lies in reducing the situation to its most basic biological constituents. This helps, but as you will see it is still a little like trying the reconstruct the jigsaw puzzle of an unknown picture when half the pieces are missing and the ones that you do have are either in dispute or keep changing their shape.

Chapter Six

DISSOCIATION between body and mind

TAKE the fertilized egg of a salamander. Allow it to develop until it begins to look something like a young amphibian, then cut through the jelly layer, remove the embryo and put it into a saline solution. Within five minutes, the complex integrated organism will be reduced to a mound of separate cells.

An alkaline medium breaks down the cohesion between cells of different shapes and turns them all into identical rounded individuals without a future. If some of these lost cells are put back into normal acidity, they rush together into a heap, all struggling so hard to hold on to each other that they form a sphere. After a while in this state of indiscriminate adhesion, the cells regain something of their old identity and regroup themselves by seeking out those belonging to their own kind of tissue. The success of this resorting and subsequent development, depends directly on the number of cells taken from the original mound. If too few are present, or some kinds are missing altogether, then the culture suffers an erosion of pattern and eventually loses all its original habits and runs down into anonymity. Only if all the embryonic parts are adequately represented, will the cells succeed in getting back into the proper shape and go on to fulfil their collective destiny and become a salamander.

In theory every individual cell has the genetic information necessary for making a functional adult. Carrot and tobacco

plants have been grown from single cells, but in the more advanced animals this blueprint seems to be useless without some extra factor provided by the presence of a number of other cells similarly equipped. The whole is greater than the sum of the parts and the essential additive provided by being communal may well turn out to be the elusive second system.

The late Harold Burr of Yale believed that this invisible organizer is an electrodynamic field.[34] He used the analogy of a magnet to explain how it might work—"if iron filings are scattered over a card held over a magnet they will arrange themselves in the pattern of the 'lines of force' of the magnet's field. And if the filings are thrown away and fresh ones scattered on the card, the new filings will assume the same pattern as the old." It is entirely possible that something like this could happen in the body of a salamander or a man. The components of even the most complex organism are being continually discarded and replaced with fresh ones drawn from the environment. The existence of a controlling field would go a long way towards resolving one of the oldest biological problems—that of explaining how it is that the new cells are able to adopt the same functions and arrange themselves in the same pattern as the old ones. A life field would also help explain why it is that we have so far failed to find any reliable way of distinguishing life from death. It is possible that while such a field exists, no matter how weak it may be, clinical death will be reversible and that goth only takes the place of life when the field has disappeared altogether.

Burr also said that the "traditional modern doctrine, that the chemical elements determine the structure and organization of the organism, fails to explain why a certain structural constancy persists despite continuous metabolism and chemical flux".[34] It was his concern over the lack of an adequate explanation for the stability and continuity of life that led him to formulate his theory of an electrodynamic field. This was first described in 1935 as a field "which is in part determined by its atomic physio-chemical components and which in part determines the behaviour and orientation of those components".[36] Up until his death almost forty years later, Burr saw no reason to change this

definition, but I think he would have been happier with both the traditional doctrine and with his theory, if he could have seen the work which has just been published on the behaviour of enzymes.

Enzymes are of vital importance to Burr's theory (of an organizer that orchestrates the arrangement of patterns in living matter without itself being changed), because they are catalysts. One molecule of an enzyme can react with and change up to fifty thousand molecules of a substrate in a single second, and emerge unscathed from this biological whirlpool to start all over again.[128] Enzyme molecules are also highly specific and of such complex shapes that few others will fit them. One of the problems in the unravelling of their undoubtedly complex roles has been understanding how such rigid structures could adapt to keep pace with changing environmental circumstances. This certainly worried Burr, but now the difficulty has been swept away. Daniel Koshland has shown that the enzyme molecule is by no means inflexible but can be induced to fit a range of chemical shapes in the same way that a rubber glove will mould itself to a variety of human hands.[151]

This is a gross simplification of the process because the shape of protein molecules is far more complex. A diffuse spider web spread across a tangle of tiny twigs and sprinkled with dew drops might be more representative of the true shape, but the same principle applies and the whole process is governed by electrical interaction. The two reactors fall into each other's fields and are drawn together by opposite electrical charges on mutually attractive parts of their structures; then the enzyme lock is induced to fit the substrate key by being pulled into the right shape by the distribution of their matching charges. Here, at the most crucial level of the organization of life, is evidence of a controlling field which is rigid enough to perpetuate a pattern and yet flexible enough to keep pace with the flux of a living system. Burr was right to call it electrodynamic.

As soon as he had perfected an apparatus sufficiently sensitive to measure electrical potential even in very small organisms, Burr began a programme of research to find out whether these fields were universal and whether or not they could be shown to

follow any recognizable pattern. In the forty years that have passed since this research began, Burr and his co-workers have proved beyond reasonable doubt that man, and every other animal and plant ever tested, possesses an electrical field that can be measured even some distance away from the body and which mirrors, and perhaps even controls, changes in that body.[229]

One of his first subjects was the salamander. Any one of these adult amphibians can be shown to possess an electrical field, complete with a positive and a negative pole, arranged along the longitudinal axis of the body.[32] A young salamander and even an embryo show this polarity, which can be measured in the water a short distance away from the animal's body. This is not really surprising. We would expect a bilaterally symmetrical organism to produce a pattern of the same kind, one with a distinct head and a tail. Burr kept on tracing the development of the field back through the growth of the embryo and found to his astonishment that it existed even in the unfertilized egg. This is the real surprise. When measurements were made on simple spheres of jelly recently laid by a female salamander, the polarity was present. Burr marked the pole where there was a noticeable drop in voltage with a blue dye and found that, after the eggs were fertilized and began to grow, the head of the salamander was always opposite this point. In other words, the embryo cells arranged themselves according to the pattern of an electrical field that was there before the individual came into existence.

An unfertilized egg is a single cell that has yet to differentiate in any way and differs from a generalized tissue cell of the animal that produced it only in that it has half the usual number of chromosomes. Like all cells it is made up largely of proteins, including enormous numbers of vital enzymes. We know that the enzyme is an electrical apparatus and generates a field, so it seems reasonable to assume that the field of the egg could be produced either by the enzymes themselves or by their action on the other protein in the cell. However the field arises, it is clear that if this is the organizer that controls the pattern of development throughout life, then it is produced entirely by the

female. We may inherit half of our genetic material from each of our parents, but it seems that the order to carry out the sealed instructions can only come from our mothers.

What could happen is that, as an embryo divides and grows, each of the new cells picks up its part of the pattern of the field and reproduces it, so that acting in concert they all together form a faithful and magnified version of the original. This could explain why it is that isolated embryo cells are not able on their own to go on and produce a complete individual; but we are still left with the problem of the tobacco plant that was grown from a single cell. It may be that all organisms which are capable of vegetative, non-sexual reproduction can do this, and that each of their cells has its own complete field like the first primitive protozoans. All this must remain speculative until someone can produce an instrument sensitive enough to distinguish partial from complete life fields.

The influence of life fields on the interpretation of chromosomal data, is not a one-way channel. Another of Burr's experiments makes it clear that the chromosomes can use the field to impart design or changes in design to the protoplasm.[33] He examined several pure and hybrid strains of maize, taking his measurements only from single seeds and found considerable differences in potential. One hybrid differed from its parent stock in the alteration of only one gene and yet this change was sufficient to produce a marked difference in its voltage pattern. With his instruments, Burr was thus able to distinguish between two strains of maize long before their differences became visible.

In later work Burr and his colleagues turned to investigations of the changes that could be observed in life fields as changes took place in the organism producing those fields.[34] They were able to use the field as a signpost, charting the course of health, predicting illness, following the progress of healing in a wound, pinpointing the moment of ovulation, diagnosing psychic trauma and even measuring the depth of hypnosis. Surprisingly, there was no attempt to use the life field as a means of determining when life itself had ceased to exist. In one experiment on the marine colonial polyp *Obelia geniculata*—Burr noted that during the first third of the animal's life, voltage gradients

increased steadily; during the middle third, they levelled off to form a plateau; and in the last third, there was evidence of regression.[35] It is implied that when the field finally disappears, then the organism is dead, but unfortunately no measurements have been made on man or any other animal at the moment of clinical death. What we do know about the life field and about the simpler fields of physics, however, does shed considerable light on the possibility of the separation of the field and its source—at least while the latter is still alive.

The earth has a magnetic field. This field changes under the influence of lunar, solar and cosmic events. Michael Faraday, the English experimental physicist, discovered that a changing magnetic field is accompanied by an electrical field; and his Scottish colleague James Maxwell went on to show that the reverse is also true and that the interaction between the two produces electromagnetic waves, which are fields that can travel considerable distances. Now that Burr has proved that living organisms possess an electrical field, and we know that this changes in response to both internal and external factors, there is every reason to assume that we too can produce field effects at a distance. At the University of Saskatchewan they have developed a detector sensitive enough to measure, from a distance of twenty feet, changes in the force field that accompany shifting emotions in the human producing that field.[267] Not all the emanations from living organisms are necessarily electromagnetic, but it seems that they obey the same fundamental laws and there is nothing in these that forbids the separation in space of a body and its field.

Most of the information we receive, comes in via electromagnetic waves of light and the higher frequencies used by television and radio, but not all communication is this passive. In the muddy rivers of Africa, long thin mormyrid fish find out about the environment by projecting a symmetrical electric field into the space around their bodies.[165] If anything moves into this field, it produces a distortion which the fish feels as an alteration of the electrical potential on its skin. The sense organs of the mormyrid, with its tiny eyes and its drooping elephant snout, extend invisibly for some distance outside the body. The

conclusion is inescapable; every time it uses the system, this funny-looking fish is having an out-of-the-body experience. It may not be the only one.

A medical officer attached to the Royal Flying Corps crashed on take-off at a small country airfield.[261] He was thrown out of the cockpit, landed on his back and lay there showing no signs of consciousness. From the hollow in which the crash took place, none of the airfield buildings are visible, but the doctor apparently saw every stage of the rescue operation. He remembers looking down at the crash from a point of view about two hundred feet above it and seeing his body lying near by. He saw his Brigadier and the uninjured pilot running towards his body, wondered why they were interested in it and wished they would let it alone. He saw the ambulance starting out of the hangar in which it was garaged and almost immediately stalling. He saw the driver get out, use a starting handle, run back to his seat, start off and then pause while a medical orderly jumped into the back. He watched the ambulance stop at a hospital hut where the orderly collected something and then continue on its way to the crash. The still unconscious doctor then had the feeling that he was travelling away from the airfield, over a nearby town, westwards across Cornwall and out at great speed over the Atlantic. The journey came to an end suddenly as he resumed consciousness to find the orderly pouring sal volatile down his throat. A later inquiry into the circumstances of the accident, proved that his view of the events on the airfield was correct in every detail.

This physician is by no means alone in his experience.[192,52,95,251] William Wordsworth, Emily Bronte, George Eliot, George Meredith, Lord Tennyson, Arnold Bennett, D. H. Lawrence, Virginia Woolf, Bernard Berenson, John Buchan, Arthur Koestler and Ernest Hemingway all wrote about similar occurrences, most of them autobiographical. A survey of Oxford undergraduates by Celia Green showed that thirty-four per cent of them had at some time had the experience of looking at their physical bodies from an outside viewpoint.[94] From the thousands of reports of apparent out-of-body experiences, I have chosen the case of the flying doctor only because it includes so

many verifiable details of an environment the subject could not have seen in any normal way or through anyone else's eyes. Flying hundreds of miles over Cornwall is quantitatively very different from the gentle probing of two feet of muddy water, but the mechanism could be essentially similar. We almost certainly use our life fields for "feeling out" things in our immediate environment; a good deal of our assessment of the character and intentions of other people is probably based on information acquired in this way. Projection over greater distances seems to occur in circumstances which we would expect to be disruptive and to involve dissociation. The vast majority of spontaneous out-of-body experiences takes place at the time of accident or illness, under the influence of drugs or anaesthetics, and during sleep or drowsiness. The few cases on record of people projecting deliberately or at will, have taken place under hypnosis or involve relaxation procedures similar to those adopted during meditation or yoga.

Analysis of a number of cases shows that, despite their diverse origins, they have a great deal in common. Most subjects are able to specify exactly where the new vantage point is located—usually it is above the body and, if indoors, it tends to be near the ceiling in a corner. Nearly all subjects suddenly find themselves out-of-body without any transition between the two states, but wherever the process has been observed it seems to follow a progressive paralysis like that which occurs in dreaming. Most disembodied subjects see their own bodies and, if it is their first such experience, often only realize what has happened when they do so. The common reaction to being out-of-body is strangely casual; most reports mention a sense of well-being and a reluctance to return.[54] A few subjects, finding themselves free of the body, have apparently managed to travel deliberately to visit friends or to seek information in the same way that a lucid dreamer, if aware that a dream is taking place, is able to influence the course of the experience.[280]

I do not find it difficult to believe that we can sense our environment in ways which have nothing to do with the traditional five systems, but I am surprised that the out-of-body view of the world is so much like the normal one that the subject

may have difficulty telling them apart. Perhaps our brains have the ability to decode all incoming information and transpose it to forms with which we are most familiar—in the same way that a radar screen converts electrical signals into a visual display for our benefit and lets us "see" through the fog. A great deal of what we normally see with our eyes is constructed in the imagination anyway, because the optical quality of the human eye is extraordinarily bad. The image projected onto the retina is blurred at the edges and fades away into iridescent haloes, but all these defects are put right in the brain. At the University of Innsbruck, students have been condemned for weeks on end to wearing goggles with prismatic lenses that not only produce a rubber world in which there are no straight lines, but also cause a rocking chair effect by expanding or shrinking the image every time the head or the eye is turned.[102] At first this is very disturbing, but after a few days the brain adapts to the new patterns and once again produces a mental image with straight and stable lines, despite the fact that nothing like this exists in the subject's environment at that time.

Rattlesnakes and all the pit vipers that have dimples like concealed headlights between their nostrils and their eyes, can locate their prey in total darkness. Each of these pits contains a hundred and fifty thousand heat-detecting cells that respond to infra-red rays from the body of a mouse; building up a picture of its size and shape and whereabouts so that the snake never makes the mistake of striking at a mongoose.[28] A snake that is familiar with the appearance of its prey and sometimes hunts it by sight alone, might well conjure up a visual image of the food when operating at night with its alternative heat-sensitive system.

There is one thing which has no equivalent in our normal visual world that crops up with great regularity in out-of-body reports. This is variously described as "an elastic string", "a silver cord", "a coil of light", "a thin luminous ribbon" and "a smoky thread".[53] It is impressive that this structure should be described in essentially the same terms by doctors, plumbers, musicians, farm labourers and fisherfolk, no matter whether they live in Florida or Latvia and despite the fact that many of

them have never before heard of astral projection. A South African psychiatrist records out-of-body experiences recounted to him in Basuto by people who could neither read nor write English and had certainly never heard others talk of the silver cord they described to him.[157] There seems to be little chance of cultural artifacts playing any part in reports like these. In the few accounts which mention the attachment of the cord, it is described as being strung like an umbilicus between the forehead of the somatic system and the neck or shoulders of the out-of-body entity. The tradition among mystics is that this cord must remain intact; if it breaks, the two systems will be permanently separated and the body will die. It is interesting that the cord of light should arise in the area of the pineal and, no matter how insubstantial the thread may be, it is reassuring to an earth-based scientist like myself to find that there is any kind of connection at all between the two systems. This may be the best point to begin any attempt to identify the disembodied entity in physical terms.

As far as I know, the earliest deliberate attempt to lay the ghost of a living body in the laboratory was made at the turn of the century by the French pioneer Hector Durville.[68] He found a subject who claimed that he could project his astral body at will and persuaded this man to try to provide physical proof of his detachment. He apparently succeeded in making a rapping sound on a table at the other end of the room, in producing fogging on photographic plates, and by causing calcium sulphide screens to glow more brightly. These poltergeist-like phenomena could have been produced by psychokinesis, and are no less exciting because of that suggestion, but they do not necessarily provide proof that a personality can be detached from its base in the body. They do, however, raise the possibility that all psychokinetic phenomena, as shown by the few special people who have proved that they can affect matter at a distance apparently by the exercise only of their minds, might be operating out-of-the-body at the time. It is hard to decide which of the two phenomena is the least unlikely.

Both are amenable to investigation. There are now several established psychokineticists who can and will produce their

talents on demand; the young Israeli Uri Geller does it several times a day, and I know of at least two psychics who claim to be able to project themselves at will. It would be interesting to know if infrared and ultraviolet light, fluorescent substances and high voltage discharges would register any kind of activity in the space around their bodies while they worked. There may well be no normal electromagnetic explanation for their abilities, but Burr's simple demonstration of a previously undetected life field with perfectly ordinary electrical properties, makes me wonder whether we have not perhaps been looking right through some other equally simple solutions.

Those who are able to project themselves out-of-the-body at will, give very precise instructions on how to do this. They recommend that no attempt be made unless the temperature is high, at least twenty degrees Centigrade, and the air is clean and dry. Mountain tops are favoured places, but only in good weather. Electrical storms are said to interfere with the results and one adept says that it always helps to "anchor oneself" by putting a hand into a bowl of water. These conditions make sense if one assumes that the phenomenon is itself electric or electromagnetic.

The most critical preconditions are those which concern the preparation of the body of the would-be projector. It is suggested that little food be taken, some say that it is necessary to fast, but all agree that a high protein diet is detrimental and that only fruit and green vegetables should be taken on the day of the attempt. We know that a vegetable diet reduces physiological acidity and that, in compensation for this, there is an increase in carbon dioxide pressure in the lungs and a reduction in the amount of oxygen getting to the brain. This amounts in effect to an increase in altitude and reinforces the preference for mountains as suitable sites.

Recommended breathing exercises produce a similar effect. Almost all the practitioners say that holding the breath helps, but that it has to be held in, not out. The author Emanuel Swedenborg added an incestuous slant to the exercise with his comment that "holding back the breath is equivalent to having intercourse with the soul". It is certainly equivalent to asphyxia

and, if held back long enough, will once again have the effect of limiting the supply of oxygen to the brain. It looks as though the unconscious intent behind these practices is to simulate a crisis in an attempt to scare the soul out of the body—or at least to weaken the bond between the two systems.

Another point on which all are in agreement is that crossing the arms or legs is bad. This belief is so widespread that it deserves further investigation. It appears wherever spirit mediums practise and has, perhaps through them, found its way into common use in the superstitious practice of crossing the fingers to preserve good luck or to reserve an individual right to break an oath or contract. I have the feeling that it goes back much further than that. When something happened to man's mind sometime in the middle Palaeolithic and he first began to dig graves, he started right from the beginning to put his dead down in certain positions. Many of them lie with their arms deliberately crossed long before Christianity adopted this practice. Wherever arms or legs are crossed in ritual, the action is a protective one with the emphasis on holding something back or in. The phrase in body language that tells of a desire to remain intact in the face of an implied threat, always includes arms folded over the chest or legs crossed above the knee. The generation of energy necessary to transmit a prayer involves a posture in which the hands are firmly linked together. Rodin's enrapt "Thinker" produces a perfect and productive circle by resting his chin on a hand which in turn rests on his knee. Always a circuit is formed. It seems to be important. Try sometimes thinking out a complex problem with your feet spread and your hands in the air.

There is a good physical reason for creating circuits. Electrons from a charged body drain away to the ground through a linear connection, because equilibrium tends to be restored and any potential difference will disappear if given the chance; but unstable differences can be maintained if the circuit is closed and current flows round in a circle. All living organisms are unstable charged bodies. Burr found that he could only measure the field strength in them by forming his own circle, by using two sensitive electrodes applied to the body at different points

and linked through his apparatus and the body in a circuit. Life generates its own charges all the time and loses a great deal in unavoidable and natural depletion, but it can probably preserve unusually high potential differences by forming circuits in times of special need; and conversely, it must also be able to produce unusually low potentials by deliberately breaking those circuits. Perhaps it is only under such attenuated electrical conditions that the second system can be separated from the first. The recommended use of a bowl of water as an earth would certainly fit in very well with this suggestion.

As far as mental preparation is concerned, the recommended techniques have a great deal in common with those used to achieve the state of transcendental meditation. Images of climbing a ladder, going up in steam, being sucked down by a whirlpool, passing through an hourglass, or turning inside out are said to help. The most explicit instructions in this area are those given by Robert Monroe, a successful American businessman who began having regular out-of-body experiences about fifteen years ago and can now control them and apparently leave his body at will. Monroe suggests starting by stretching mentally for an object you know to be out of normal reach. "When you reach out in this fashion and feel nothing, push your hand a little farther. Keep pushing gently as if stretching your arm, until your hand encounters some material object . . . When it does, examine with your sense of touch the physical details of the object. Feel for any cracks, grooves or unusual details which you will later be able to identify." Repeated short forays of this kind, gradually extended farther afield, are said to lead in the end to the total removal of the entire second system to a point some distance from the immobile body.

Charles Tart of the University of California has recently completed a pilot physiological study of Robert Monroe. This is one of the very few ever made, on a subject who claimed to be able to move out of his body at will.[154] Electroencephalographic records of Monroe in this state show that he was not dreaming, nor properly awake, but producing slow alpha wave activity while his body was in a state of semiparalysis. Reading this

report, I am reminded of the fact that Russian research indicates that a synchronized production of alpha in both parties is a necessary precondition for telepathic contact between two people.[203] Projection would certainly provide an explanation for many of the observed phenomena of telepathy. Tart has now begun working with a young female subject who shows a slightly different brain wave state and cannot project as easily as Monroe, but has already succeeded in correctly reading a five-digit random number displayed on a shelf above her eye level in an adjoining room.[264] The difficulty in deciding whether to classify this as a telepathic, clairvoyant or out-of-body experience, is indicative of the close relationship of these phenomena to each other.

The instructions for projecting are so explicit that it is impossible not to put them to the test. I have tried for some time to follow all the suggestions outlined above and succeeded in achieving some very pleasant and deeply relaxed states of contemplation, but have failed so far to experience any kind of real separation. This means nothing. I am quite prepared to concede that I lack the necessary skill and patience. Next time I try it might well work. I hope so, because there is something very appealing about the doctrine of astral projection; not just the notion of free and unrestricted travel, but the scientific satisfaction inherent in finding a key which could open so many as yet ill-defined psychic doors. If telepathy, clairvoyance, psychokinesis and hauntings can all be accounted for by an explanation which is based on just one assumption, then this must commend itself to any scientist. A belief in out-of-the-body experience involves only one article of faith. Namely that there are two of us in each of us, a somatic system and another one; and that the second system is usually attached to the body, but can leave under certain circumstances so that we may sometimes veritably be in two places at one and the same time. An acceptance of this assumption makes it possible to find logical explanations for a wide range of other psychical phenomena. Practised projectors claim that the reality of the body they call astral has been proven, and that anyone can demonstrate it for himself. My one spontaneous experience with it predisposes me

to believe that this is true, but I have not (and I cannot find evidence that anyone else has either), been able to demonstrate the reality of the second system under controlled conditions and beyond all reasonable doubt. The most we can say at this time is that there is nothing in biology to suggest that an alternative to the body does not exist. In fact, there is much in natural science which very strongly supports the hypothesis. The life field does not fulfil all the requirements of the traditional astral body because it ends with absolute death: whereas astral bodies by definition are believed to be totally independent of the somatic system. But the one thing the life field does is to provide a tangible introduction to this difficult and insubstantial area.

The most tenuous aspect of the astral body doctrine is this belief that the second system continues to exist after the death, and even after the disintegration of the body. The only empirical evidence so far available comes from a series of tests done years ago in England and in Holland by three completely independent medical men. Dr. R. A. Watters tried to photograph the emerging astral bodies of mice, chickens and frogs at the moment of death.[42] He built special vacuum chambers, and ones filled with water vapour and oil, and succeeded in getting pictures of cloud-like masses hovering over the animal's body; but all these forms could equally easily have been produced by normal physical means. In the Hague, Dr. Zaalberg VanZelst weighed dying patients and claimed that there was a sudden loss of weight of exactly 69·5 grams at the moment of clinical death.[191] Similar tests in England by Dr. Duncan McDougall came up with the precise Imperial equivalent of $2\frac{3}{7}$ ounces. The correspondence between the findings is remarkable, but knowing what differences of opinion exist about the identification of the precise moment of clinical death, it is difficult to take these experiments at face value. They should be repeated under more carefully-controlled conditions, because a correlation between a definite weight loss and some clearly recognizable event such as the cessation of brain waves, would be fascinating.

Many anecdotal observations have been made at death beds and it will surprise nobody to learn that these refer to ghostly clouds and shapes hovering near the deceased, but there is a

surprising uniformity of detail in many accounts. The mist is always said to leave the body at the head end, very often in a spiral flow, and then to form into a definite and recognizable body shape that lies horizontally about two feet above the somatic system before dissipating.[63] Professional clairvoyants also tell of "spirals of energy" leaving the bodies of the recently dead. One report tells of observing these spirals as long as three days after clinical death.[88] At a military laboratory for physiological research in Leningrad, an instrument similar to those in use for detecting magnetic fields in space, has been adapted for detecting Burr's life fields.[236] It can do this successfully at a distance of four metres from the living body and continues to register emission from a clinically dead human body whose brain waves and heartbeat have ceased. In one case, the emission after clinical death was greater than that observed in any normal living body, except for one that at the time was engaged in a demonstration of psychokinesis.[208]

In the biological sense, a clinically dead body is still very much alive. If this were not so, it would not decay. The body continues to metabolize and to emit heat, so there is no reason why it should not continue to sustain a measurable field for as long as any biochemical activity at all takes place, though the chances are that this field will change its character. Is there any possibility that a cohesive field could be sustained after the collection of matter which produced it, has been disbanded? There may be.

Burr concluded that his field both determines and is determined by the organism with which it is involved. This reciprocal action fits well with the new quantum mechanics. When it was known only that action in matter produced waves and formed a field, it was impossible to conceive of a wave pattern that could continue to exist for long after the matter which produced it had disappeared. Now that we know that matter itself can be wave-like, the problem no longer exists. My understanding of the theory of matter is rudimentary, but at least it seems clear that the physicists have no theoretical objection to the existence of matter waves in free space. We have absolutely no evidence to suggest that this is how an energy body or a personality sur-

vives in the absence of its physical counterpart; but it is important to note that it could do so.

The intangible second system has a biological parallel in the "queen substance" of the honey bee. When this circulates in a hive, the complex community goes about its collective business, but within minutes of its disappearance, the integrated organism loses its direction and becomes a disorganized gibbering idiot. It ceases to exist as an organism, but the substance that provided that unity can be carried away in a bottle and kept intact. Eventually it too will fall apart, just as I believe that the energy body decays in time. This is pure conjecture on my part, but it seems to make biological sense to assume that the second system's time is as limited as the first. It remains with the somatic system for a while after both clinical and absolute death, but eventually leaves and, when it does, the matter loses life and becomes goth. It is possible that the second system continues to survive, relatively intact for a while into goth, but I suspect that it too slowly attenuates and eventually loses its unique pattern. Physically and biologically I can see no reason why, and no way how, the alternative system can survive indefinitely. I am not using this as an argument against immortality; there may be yet other systems that continue to survive as vehicles for the spirit long after the two I have been considering have decayed. But I think that the second system or etheric substance or astral body or energy double or fluidic counterpart, or whatever you care to call it, must eventually go the way of all flesh.

It seems that, despite the fact that the personality is based on and largely determined by biological processes, it does have a certain independence. This is manifest mainly in dreams, which apparently function as a channel for the organization of memories in an area that has yet to be precisely located, but could be apart from the body.

The nature of transcendental experience and the success of practices such as acupuncture, support the mystical tradition of dualism in the body. There is no irrefutable scientific evidence for an alternative system to the familiar somatic one, but the discovery of life fields suggests that we have by no means explored all the possibilities.

The prevalence and consistency of out-of-body experiences, suggest that separation in space may well be possible. There is nothing in biology that denies this possibility, and much that could be simply and logically explained by the existence of a relatively independent second system.

We know that dissociation within the body and brain is of common occurrence, and it seems that there is no valid reason for setting spatial or temporal limits to the process. The techniques for producing detachment by conscious control create conditions which are very similar to those that occur spontaneously in anaesthesia, accidental unconsciousness and dying. If separation can take place in a living organism, and there is much to suggest that it does, then we cannot deny that it could also take place in one that is in the ambivalent state that follows clinical death.

So, it is biologically possible for an individual, in some form and at least for a short while, to survive death.

Part Three

SOUL

In the second volume of his autobiography, Arthur Koestler tells of his imprisonment under sentence of death by Franco's troops in Spain.[150] While in solitary confinement, he had a visionary experience in which he came to feel that "the 'I' had ceased to exist". He goes on to say that it "is extremely embarrassing to write down a phrase like that when one has read *The Meaning of Meaning* and nibbled at logical positivism and aims at verbal precision and dislikes nebulous gushings". Like all others who have had experiences of this kind, he finds it impossible to express what has happened in words without debasing it. Rosalind Heywood suggests that all attempts to "communicate the incommunicable" are doomed to failure because our normal senses cannot cope with totally new kinds of information."[115] When Darwin's "Beagle" appeared in their island channels, the Tierra del Fuegans did not even notice it because their imaginations could not encompass so vast a ship.

The anthropologist Edmund Carpenter believes that we live in a sensory environment totally different from that of preliterate man, simply because we have learned to read.[41] He says that in "shifting from speech to writing, man gave up an ear for an eye, and transferred his interest from spiritual to spatial, from reverential to referential". All inner states are now described as outer perceptions. We say "thereafter" instead of using the logical *thenafter*; we use "always" (meaning all ways) when what we really mean is *all times*; and we refer to something being "before" (which is in front of) when we mean *earlier than*.

Our panoply of senses have become subordinated by one of them, by sight. Today it alone is trusted and all truth is expected

to conform to observed experience. "I'm from Missouri," said Harry Truman, "show me". We say that "seeing is believing", and that "I wouldn't have believed it, if I hadn't seen it", but it seems to have escaped our notice that this emphasis on one kind of sensory experience could also mean that "I wouldn't have seen it, if I hadn't believed it".

The eye is an extraordinary organ. It isolates particular things and extracts them from a total situation. Children born without arms or legs have the greatest difficulty seeing things in depth. We discover depth and perspective by touch and experience—and then marry these sensations to sight. Things are programmed into our mental computers so that they make sense to us in future, purely on the basis of our experience with these things in the past. A pygmy from the dense forests of the Ituri, where it is never possible to see very far, is astonished by the tiny antelope he sees in the distance when taken out on to the plain for the first time. In the perpetual gloom of the forest floor, sound is more important than sight, and the pygmy's experience is arranged by a different kind of sense life. His is a separate reality. Sight has a natural bias towards detachment and pinpoint location. We visual creatures even hear with our eyes, we listen *to* music, while the multi-sensory pygmy merges *with* it. The ear accepts information from all directions simultaneously, so better listeners than we can wrap themselves in their environment more easily.

Simply because we read a lot, which means employing only one sense—and that one in a highly restricted way, we have destroyed the harmonic orchestration of our senses. We have programmed ourselves in a way that might make it totally impossible for us to respond to anything that wasn't built on the same bias. An astronaut confronted with a totally new life form, something really odd, might not be able to experience it at all. We solve all our perceptual problems in a mental computer programmed both by evolutionary conditioning and by our own personal experience of the world. This old programme could well be inappropriate and prove to be inadequate, when it came to solving a new problem posed by a completely different kind of sensory experience.

Under the dictatorship of the eye, all information is translated into a visual code. Inner experiences are expected to conform to outer perceptions. If they fail to correspond, then we dismiss them as hallucination. Anything that cannot be clearly seen, has not been sensed, it is nonsense. Science insists on seeing how things work, it demands "observations"—visual experiences encoded in verbal reports. But what can we do with sensations that avoid easy visual description, that evade verbal classification?

Imagine a child who rises at dawn and goes out to track rabbits through the dew; smells the damp of fresh patches of bone-white mushrooms; tastes the bloom on grapes picked cool and straight from the vine; meets two of his best friends and runs shouting down the hill to swim in a river still milky with melted snow from the mountains; lies drying in the sun on the rough bark of an old tree trunk and listens to the sound of a distant bell. He comes home and his mother wants to know where he has been. "Out." And what has he been doing? "Nothing." When forced to give some adequate reply, he might say "Swimming", but this answer is acceptable only to the parent. The child knows how inadequate words are for describing any total sensory experience.

In our attempts to come to terms with unusual experiences, we run into the same kind of difficulty. We describe them as visionary, putting the emphasis back on the eyes, when sight may have had nothing whatsoever to do with the experience. We need a new approach, new attitudes and an entirely new vocabulary, but we have none of these things.

This distresses me. I have worked long enough within the scientific discipline to know its limitations, but I still believe that there is value in its method. I think that there are meaningful answers to be found in totally non-scientific approaches to problems like these of life and death, but I believe that any workable solution which is going to mean something to large numbers of people in our society, will have to be more or less firmly based on established scientific tradition. The hard science of physics has broken through the barrier of weights and measures into the magic world of black holes and antimatter. I believe that biology is headed in the same direction.

In this third and last section, I will start with the new discoveries that seem to me to be leading this way, and end with an account of a phenomenon which, although it still sets my mind reeling, does I think provide us with our first clear view of some of the hidden realities of life and death.

Chapter Seven

SURVIVAL without the body

On the morning of 21 September 1774, Alfonso de Liguori was preparing himself for the celebration of Mass in prison at Arezzo, when he fell into a deep sleep.[192] Two hours later he recovered and announced that he had just returned from Rome where he had seen Pope Clement XIV die. At first this was attributed to a dream and then, four days later when the news of the Pope's death arrived, to coincidence. Then it was discovered that all those in attendance at the bedside of the dying pontiff had not only seen but talked to Alfonso, who had led them in prayers for the dying.

In 1921, James Chaffin of North Carolina died, leaving all his property to one of his four sons who himself died intestate a year later.[393] In 1925, the second son was visited by his dead father dressed in a black overcoat, who said, "You will find my will in my overcoat pocket." When the real coat was examined, a roll of paper was found sewn into the lining with instructions to read the twenty-seventh chapter of Genesis in the family Bible. Folded into the relevant pages was a later will than the first one, dividing the property equally between all four sons.

The first of these stories deals with someone who seems not only to have projected himself to a distant spot, but to have been seen there by other people. The second tells of someone who was also seen and heard some distance from his body, in this case four years after his death. The reported meeting with a man known to be dead does not on its own provide proof of survival of death, but if walking–talking apparitions of the

living can be connected to conscious projection by the person involved, then the possibility exists that apparitions of the dead may be produced in the same way. In other words, behind every ghost there may be a conscious projector. This would be true survival, but such a thing seems to be impossible to prove.

The evidence suggestive of survival is not overwhelming. Even if we assume that, on biological grounds, it is only possible for dreaming organisms (which in effect means just the mammals), we are still left with an enormous pool of possible survivors dating back more than a hundred and fifty million years. It is certain that the vast majority of dead mice and men tell no tales and have vanished without trace.

We can account for this relative lack of information on four main philosophical grounds.[26] Either these organisms never had any second systems; or these have faded away and ceased to exist; or they have gone somewhere else; or they have been re-embodied here in new living organisms. All of these are reasonable explanations and already provide the basis for most of the world's major beliefs, but there is at least one other possibility. The disembodied dead could be piled up in great heaps all around us in some form which we are incapable of recognizing.

It is not easy to experience the unfamiliar, the things which have no names. Some people claim that they can see the dead, so we label them psychic and look at them a little askance, but perhaps they can. Any sensory experience is partly skill and any skill can be cultivated. Wilfred Thesiger, in one of his superb books on the desert, tells of an old grey-bearded Bedouin who got down from his camel to look at some blurred tracks in the sand, crumbled a few dry droppings between his fingers and announced, "They were Awamir. There were six of them. They have raided the Junuba on the southern coast and taken three of their camels. They have come here from Salma and watered at Maghshin. They passed here ten days ago."[265]

Skilled trackers are trained to see things that others would not notice. The shortcoming here lies not in the sense organs, but in the computer program. The range of human sensitivity is wider than it sometimes seems. There are people with special talents

who hear sounds that to others are supersonic, or see wavelengths that would normally be invisible, and it may be possible for all of us to practice this kind of sensitivity. Infrared light waves for instance are beyond the capability of the cone-shaped cells in our retinas, but they may be just within the range of the rod-shaped ones that lie more densely packed around the edges of the screen. The folklore on fairies and nature spirits has always advised against looking straight at them lest they disappear in fright. Perhaps there are things going on all the time we could learn to see by simply looking out of the corners of our eyes.

One of the oldest and most persistent of occult ideas is that all bodies are surrounded by an energy cloud or an "aura". This is described as a colourful emanation, taking roughly the same shape as the body and normally extending between one centimetre and a metre from it. The aura of the Buddha is said to have enveloped an entire city. A few people see this spectral haze very easily, and have done so ever since they were children. Some others can possibly be trained to see it by a "sensitizing" process that involves first looking through screens filled with a coal-tar dye, but most of us require a more mechanical aid.[9]

In the late nineteenth century, the Yugoslavian genius Nikola Tesla invented a coil that not only made alternating current possible, but also drew sparks from all parts of the human body. In 1909, a French physiologist used a similar device to register an electrical aura and produce a picture of his hand glowing in the dark as though covered with luminous iron filings. In 1939, two Czechoslovakian scientists published the first "electrographs", which showed leaves with shiny coronas of an unidentified electromagnetic emission. And in that same year a Russian electrician and his wife independently made a similar discovery. Semyon and Valentina Kirlian built an instrument which consists basically of a sandwich of condensors and generates a high-frequency electrical field.[147] The sub-title of their first major paper on the instrument describes precisely what they were doing with it: "A method for the conversion of non-electrical properties of the object being photographed into electrical ones . . . with a direct transfer of charges from the object to the photographic plate."

In the last thirty years, the Kirlians have photographed a galaxy of patterns emanating from leaves, fruits, whole plants, small animals and every part of the human body. These luminous hieroglyphs can be shafts, beams, flares, striations, crowns or clots; sky blue, lilac or yellow in colour; bright or faded; they may glow constantly, twinkle or flare from time to time; they can be stationary or moving. The lastest motion picture films from Russia show quite clearly that these displays change all the time, apparently in tune with the change of health and state of mind of the subject being photographed—and that every alteration of the haze around the body is of the kind long described by those sensitive people who can see it all with their own eyes.[268]

These patterns are in many respects similar to the behaviour of plasma that can be seen in observation of the sun, so the Soviet scientists have begun to call the aura a biological plasma body or bioplasma.[129] A plasma is a gas that has had all the electrons stripped off the nuclei of its atoms. This normally occurs only at very high temperatures in thermonuclear reactions, but there are reports which suggest that electrons could be similarly emitted by a body at the usual temperature of living matter.[1]

Thelma Moss and Ken Johnson at the University of California have built their own high-voltage, high-frequency apparatus on which they have taken photographs similar to the Russian ones.[187] They prefer to call their method "radiation field photography" and they stress the fact that changes in frequency, voltage and exposure time all produce dramatic differences in the results. But if the parameters of photography are held constant, then there are still visible changes that can only be caused by the subject. They have now photographed over five hundred people and find that each one has a unique and recognizable basic pattern that changes slightly from day to day and from mood to mood. Certain kinds of food and drink produce rapid changes. In one pair of pictures taken just minutes apart, a fingertip first appears as a black blob with a tiny ring of flares around its perimeter like a shot of the total eclipse of the sun. Then, after the subject has taken a drink of alcohol, he suddenly becomes all "lit up" and the second picture shows a brilliant

wide white halo surrounding a pad on which every ridge and whorl of the fingerprint is outlined in light. Moss adds that this is a true radiation field effect which has nothing to do with an increase in body temperature and no correlation with the constriction or dilation of blood vessels.

Moss and Johnson have shown that marijuana nearly always produces an increase in brightness of the corona of the kind that occurs after exercise. They also tried photographing subjects in relaxed states under various conditions and found that they could produce changes in brightness when doing yoga breathing exercises or going into transcendental meditation. There were dramatic changes in the corona before and after acupuncture treatment, but absolutely no reaction to needles stuck in just anywhere at random. By introducing an optical attachment which made it possible for the subject to see his own corona, it was found that this feedback training enabled him to bring the flare under conscious control. The fact that emotion has a great deal to do with the quality of the emission, was nicely demonstrated by the purely accidental discovery that an attractive female photographer got brighter than usual coronas from all the usual male subjects.

Perhaps the most interesting findings of all in this imaginative series of tests were those that showed that the energy involved in producing these pictures could, under certain circumstances, be transferred from one subject to another. When a subject was put under hypnosis his corona increased in brightness, but a simultaneous series taken from the hypnotist found that his emission had dimmed. This is the first time it has ever been demonstrated that hypnosis is not just something you do to yourself, but that the hypnotist actually makes a tangible contribution to the relationship.

Douglas Dean at the Newark College of Engineering has built a photographic apparatus including a large copper plate which develops pulsed square waves of forty thousand volts. With this he has produced two of the most exciting pictures yet to emerge from this entire area.[180] When Ethel DeLoach pressed her fingertip to the plate, it produced a lilac-coloured spray of fine threads radiating out about one centimetre from

the pad in a pattern much like that made by anyone else ever tested in this way, but Mrs. DeLoach is not an ordinary person. She has a considerable reputation as a healer, so before the next photograph was taken, she was asked to place her free hand on the arm of a friend and to try to cure a sebaceous cyst that lay there as a lump beneath the skin. She applied herself mentally to this task of healing and exactly two and a half minutes later a second shot of her same finger was taken while still resting on the same spot on the copper plate. This picture is astonishing. It shows the black pad of the finger surrounded by the same hair-like mass of fine lilac strands, now standing up straight and extending about twice as far from the skin, but right on the tip of the digit there is an entirely new display. Burning out from the surface is a vivid orange crown of flame like a ring of gas jets in a blast furnace. Here is superb evidence of what seems to be a deliberate transfer of energy from healer to patient and, to complete the picture, Dean reports that the next day the troublesome cyst had totally disappeared.

When the work of the Kirlians first came to the notice of scientists in the West, it caused a considerable furore. It excited many, but also left a large number very sceptical because there was some secrecy surrounding the apparatus itself. In recent years, Moss and Dean and several others have succeeded in producing similar results quite independently, but sceptics remain to be convinced that the observations are directly correlated with energy changes in the living system, rather than just random fluctuations associated with inadequate experimental technique. There is also a third explanation which may prove acceptable to both parties. It is possible that the "Kirlian aura" pictures are produced by simple corona discharge phenomena, but that these are directly influenced by changes in the chemistry, electrostatic potential, electron emission characteristics or dielectric properties of the skin. Whatever the final outcome of their debate, it now seems unreasonable to doubt that the living body produces, or at least is associated with energy that can be made visible by high-frequency electrical discharge.

Exactly what kind of energy is involved, is still open to

question. We know that the body produces heat energy which can be vividly demonstrated in thermographic techniques that involve painting the body in liquid crystals, but this is not the source of the aura. Every time a nerve cell discharges as impulses are carried to and fro from the brain, there is a measurable difference in potential, but this is clearly understood and seems not to be involved. When these sources are combined with the mechanical and electrical energy created in the muscles, blood vessels and brain, they form a radiation fingerprint which is unique for every species; but there is still another as yet undescribed source that adds the special characteristics of the corona and makes the pattern unique for each individual within that species.

William Tiller of Stanford University believes that the evidence we already have is enough to prove that the somatic system is supplemented by at least one other.[209] He calls the combination the "human ensemble" and suggests that the most reasonable approach yet made to an interpretation of this complex, is the yogic philosophy of the seven principles. In the West this system of thought is best known through Theosophy, a movement started in 1875 by the extraordinary Madame Blavatsky, whose esoteric knowledge of Vedic, Buddhist and Brahmanist literature has been popularized by Annie Besant.[215, 216]

The first level of substance is that of the familiar somatic system which operates on the Einsteinian space-time frame—about which we already know a great deal. If we are going to assign the new discoveries to their relevant places, then Burr's life field with all its electrical effects fits in here. The second is the etheric level which is said to be inhabited by the "etheric double" that is unable to leave the body and is primarily concerned with health and the absorption and distribution of *prana*. The *chakra* are apparently located at this level and so, if this is where acupuncture operates, then this is where the new bioplasmic or energy body belongs. This level forms a bridge between the first or physical and the third or astral level. The etheric double is traditionally supposed to decay and disappear not long after the dissolution of the body, which fits well with my suggestion that we need to postulate a biological state inter-

mediate between clinical death and what I have called goth. In this model of life, the "organizer" and the "second system" which we discussed earlier would be divided between the first and second levels, being composed partly of the life field and partly of bioplasma. Absolute death marks the end of the first level and the destruction of the field, but some patterning and perhaps something of the memory and personality survive as bioplasma in the etheric double, until this too disappears at some time after goth.

On the third level is the "astral body" that is said to be little more than a vehicle for the mind (which is found on the next three levels) and the spirit (that exists on the seventh plane). Levels four to seven need not concern us here, because it will be a very long time before science can begin to explore these in the way that it now seems to be getting a toehold on levels two and three. The astral area on level three is also difficult to get to grips with, but it is an exciting one to explore, because this is where life in some form must take refuge if it is to survive both death and goth for any length of time. The evidence we already have concerning separation and what has been called astral travelling, suggests very strongly that this area has an objective reality and probably can be examined. The second level is very much more amenable to investigation and I see no major obstacles to our soon being able to formulate physical laws to describe precisely what happens in the etheric area. There may be new and different kinds of energy at work there, but I suspect that they will be found to obey the same rules of behaviour as first level matter.

Tiller suggests that matter of the second or etheric level may have the characteristics of a hologram. This is a sort of photograph invented by Gabor in 1947 which consists typically of a piece of film, but it is nothing like a negative of the ordinary kind. To look at normally it is an unintelligible pattern of light and dark patches, but if viewed in the same special optical conditions under which it was taken, this pattern becomes a three-dimensional picture. It is the sort of photograph you can tilt so that, even if Aunt Mabel is standing right in front of the Parthenon, you can peer around her to see the architecture in

the background. You could, if you so wished, even see the back of her neck, and you could also share this unique pleasure with the entire family without making any copies of the picture. Just cut it up into little pieces, because every fragment of a hologram can be used to reconstruct the entire image in the same way that every living cell carries the necessary information to construct a complete organism.

This is a fascinating idea which excites me more every time I think about it. Here we have an established physical principle which could account, not only for the phenomena of psychokinesis and telepathy, but for all the cosmic and mystical experiences that involve feelings of "at-oneness" with everything. This seamlessness or unity is the one common denominator of all visionary states, whether they be produced by drugs, isolation, training, shock, beauty, music or sex. In all peak experiences, the "I" ceases to exist and seems to become part of the 'All". If each of us contains just one tiny fragment of the cosmic hologram lodged anywhere in any of the seven possible levels, there is absolutely no reason why this should not be so. And, best of all, this idea cannot be discarded as nothing more than a web of idle semi-scientific fantasy, because we already have some evidence that such a hologram does exist and can penetrate from the etheric through to our somatic level

Remember the "ghost" of the leaf? When part of a leaf was cut away and totally removed, it could still be seen in faint outline occupying its original place. When part of a man is amputated, many of his sensations insist that it continues to exist as before. The image remains intact, because the whole structure is embodied in every part. To be sure, these are flimsy strands of evidence, too thin to be called positive proof, but they seem to me to be powerful hints that this could be the one line of research most likely to lead to a breakthrough into those other mystical levels.

Another useful hint about the second level, again from Tiller, is that it might operate on a magnetic rather than an electrical basis. Psychics claim that the aura has two layers and that the thin dense one that lies close to the body can be distorted by a magnet. Dennis Milner of Birmingham University has photo-

graphs of coronas being unbalanced by the approach of a magnetized compass needle.[180] The neuropsychiatrist, Shafica Karagulla, has been working with unusually sensitive patients for the last fifteen years and reports that one of these can identify north and south poles on unmarked magnets simply by looking at the colour of the field she sees surrounding them.[139] The north-seeking pole always has a bluish haze, while that surrounding the south pole is reddish in colour. When Karagulla held a magnet to her own hand, the patient described a red haze pointing towards the palm and repelling the fields of the hand. It proved to be the south pole of the magnet. When the north was used, its blue haze attracted and seemed to fuse harmoniously with the energy of the hand. Bertha Harris, who specializes in reading the aura, says that she can do this most successfully when she sits facing south, and that when working in the southern hemisphere she found that she had to turn round and look towards the north[180].

When measurements are made of the magnetic field strengths around living bodies, some are found to be significantly different. The Leningrad Institute of Metrology has discovered that the field surrounding the body of a local woman, Nelya Mikhailova, is only ten times less powerful than that of earth itself.[209] This extraordinarily high reading may have something to do with the fact that Mikhailova is one of the most successful living psychokineticists. She has proved repeatedly under rigorously controlled laboratory conditions, that she can move distant matter, apparently by the conscious effort of her will over the field that her body produces. In her most convincing demonstration, she succeeded in separating the white and the yolk of an egg placed two metres from the position where she sat strapped into an array of monitor apparatus. And, while she was doing this, the instruments revealed that her pulse, her brain rhythm and the field of electrostatic and magnetic energy around her body were all oscillating at the same frequency of four cycles per second.

It is unlikely that this synchronicity could be coincidental, and it might be significant that the rage of a temper tantrum is known to be accompanied by simular patterns. I have suggested

elsewhere that all poltergeist phenomena may be produced unconsciously by someone in the vicinity who was suffering from a similar frustration of pent-up aggression.[286] It is known that meaningless things, like furniture being knocked over, most often take place near someone who is going through a period of difficult emotional adjustment.[224] At such times these people would find tremendous release in being able to lash out and lose their tempers, but they have usually reached an age where it is no longer socially acceptable to destroy the furniture. So, instead of consciously kicking a chair over, they unconsciously get their force fields to do it for them.

If this theory has any value, then Mikhailova is a "conscious poltergeist". She certainly seems deliberately to summon up anger to do her work for her at a distance, but this is not necessarily true of all those who practise psychokinesis. I have worked several times with the very talented Israeli psychic Uri Geller and he seems always to be very cool and collected. On one recent occasion on a live television programme in London, Geller briefly handled an ordinary table fork brought directly from the BBC canteen and then put it down on a table two feet away, where I and millions of viewers watched it bend until the tines stood at right angles to the handle. A few minutes later he bent the minute hand of a wristwatch almost double, despite the fact that it was enclosed behind an intact watch glass and never left my hand for a moment. On the same occasion, the studio switchboard was jammed, while the programme was still being transmitted, by dozens of viewers all over Britain whose cutlery, rings, metal bracelets, and watches had been seriously distorted while Geller was performing. One can only suggest that his talents are sufficiently electromagnetic to be channelled in a broadcast transmission, because these things would not happen when programmes on which he appears have been pre-recorded.

Unconscious poltergeist powers are usually limited to a fairly small area. The only really good quantitative study was made on physical phenomena surrounding a young shipping clerk in Miami. He was tested in a large warehouse and the movements of nineteen objects in his vicinity were both watched and

measured. There was a definite pattern to the movements; with objects close to him travelling for short distances on a clockwise path with an outward component, and objects farther away moving longer distances in a counterclockwise direction towards the subject. The existence of this pattern, together with the fact that most movements started to the left and behind the young clerk, suggests that despite the random nature of the occurrences, they do follow a pattern which would be consistent with the existence of a physical force field.

It is odd how often patterns can be found to fit the occurrence of otherwise unexplained phenomena, and interesting how often these patterns turn out to be based on magnetic fields. Navigation is bedevilled by the fact that the earth's magnetic field is riddled with local deviations and irregularities. These faults have been very carefully plotted and the most persistent of them have become quite notorious. One of these lies off the Bahama Islands, another in the English county of Sussex and a third near Prescott in Arizona.[143] Periodically, all hell breaks loose in one of these places and poltergeists start flinging things around, apparitions and unidentified flying objects appear, people and sometimes vehicles unaccountably disappear, mysterious fires break out and there may even be hysteria or a form of mass madness.[210] There are thousands of these weak spots all over the planet and each of them occupies a precise geographical location, nearly always with a long history of demons, monsters and mayhem. To occultists, such places are "gateways in the etheric envelope of earth through which beings from other realities seep into our lives". To UFO cultists, they are "windows in the sky through which vehicles fly from other space-time continuums". To somewhat perplexed biologists like myself, they provide a fragile handhold on otherwise intangible phenomena.

Geologists, physicists and psychiatrists are now investigating these anomalous areas and finding, more often than not, that the archaeologists have beaten them to it. Stonehenge, Delphi and Baalbek all lie slap in the middle of a "window" area. And so too do Lourdes and Bethlehem. The Vatican in the Middle Ages ordered priests to build new churches wherever possible on

the sites of old temples, because the tradition of sacred places is one that is deeply engraved and based largely on observations of abnormal manifestations which may date back thousands of years. Careful examination of the local traditions shows that they specify not only a particular place, but also a predictable time. The Bell Telephone Laboratories recently made a computer study of some of the unusual occurrences collected by the impish Charles Fort—and found that frogs fell from the sky most often on Wednesdays, but usually according to a cycle of 9·6 years. When cycles of this kind are plotted against cosmic events, they correspond precisely to interactions of solar and lunar influences producing unusually large fluctuations in the earth's magnetic field, and placing additional strain on the existing faults in haunted places.

In December 1945, five TBM-3 Avenger torpedo bombers of the United States Navy took off from Florida and disappeared without trace somewhere off the Bahamas. A Martin Mariner PBM flying boat with survival equipment was sent out after them and that too vanished into thin air. In the last seventy years, more than a hundred ships and planes and over a thousand people have been swallowed up whole in this notorious area.[254] Several attempts have been made to plot this hole in the sky and to correlate it with other black spots. The most complex is that made by Bruce Cathie, a captain flying for the National Airways of New Zealand.[45] He believes that these points fall on the lines of a grid of rectangles each forty-five square nautical miles in area, set up on mathematical co-ordinates based on the harmonic relationships of gravity, the mass of earth and the speed of light. His mathematics has the strained quality of a numerologist trying desperately to prove a point at all costs, but the patterns he contrives do seem to coincide with the location even of things like earthquakes and volcanic activity. After working very carefully through his argument, I am still not certain what direct connection there is between gravity and de Gaulle, but Cathie was able to use his system to publicly predict the exact day and time of the explosion of the French nuclear device over Mururoa Island on 25 September 1968.

The most appealing aspect of Cathie's grid is his claim that it makes sense of all the apparently unrelated mass of sightings of unidentified flying objects. This is no longer a matter of concern only to the much-maligned lunatic fringe for a Gallup Poll taken in November 1973 shows that the majority of Americans, fifty-one per cent, now believe in the reality of so-called "flying saucers".[300] Eleven per cent, that is a possible twenty-five million people, claim to have actually seen a UFO of some kind. Marsh gas, car headlights, Venus and spots-in-front-of-the-eyes are no longer adequate explanations for a phenomenon of this magnitude. There may be something in the theory now gaining ground that man migrated to Earth from some other planet, or was seeded here by some superior race or was actually produced by the union of that race with earthly animals. The discovery of old maps in library basements, metal cubes in blocks of coal, and perfect glass lenses in ancient quarries, all adds up to a body of evidence that is growing large enough to become a valid alternative to the little pile of fossil fragments on which the evolutionary theory of man's development is based.

I do not think that there is going to be any simple answer to all these problems. No theory based only on Mount Ararat, or Atlantis, or a collision with Venus, can account for all the facts. I am impressed by the historical and archaeological evidence for a very old and highly developed civilization, perhaps even contemporary with Neanderthal Man; but as a biologist I find it impossible to believe that we have no evolutionary link with the other animals around us. This is why I find something like Cathie's grid so appealing. It sets up a mechanism based only on earth's natural rhythms, that allows almost anything to happen. Given only that there are certain spots on our planet's face that house persistent energetic anomalies, we can easily come to terms with the idea that it is in these places that mutations will most often occur; or new ideas will be generated; or collective hallucinations will take place; or things will behave abnormally; or changes in physical state will be most simple; or visitors will leave or first appear.

I also believe that we are far too quick to attach the blame for many mysteries to some convenient extraterrestrial intelligence.

We may well be right to do so, but not until we have exhausted the possibilities inherent in ourselves.

The amount of money spent on investigations at Loch Ness alone is proof that everyone loves a good monster. The local tourist board would be delighted if it could be demonstrated beyond doubt that the loch was a staging post for the arrival and departure of horse-headed, many-humped denizens from Orion, but perhaps there is a more simple explanation. I first started visiting the loch and talking to people who had seen something there in 1960 and, right from the beginning, I was impressed both by their honesty and their helplessness. It is certain that phenomena occur very often in Loch Ness, but it is equally certain that these happenings are strangely, almost deliberately, elusive.

Consider one example. On 26 August 1968, F. W. Holiday of the Loch Ness Investigation Bureau was watching the water from a camera platform at Abriachan on the south bank.[121] The loch at this point is about a mile wide and there were two other official camera trucks stationed four miles apart at Tor Point and Quarry Brae on the north bank, so that between them the three observers could see every part of the eastern half of the loch. Holiday was nearing the end of seven hundred hours of watching and knew that a sighting, which occurs on average once every five hundred hours, was long overdue. He says, "I kept a sharp lookout from first light onwards and continued the watch through breakfast. Just after 9.30 Mrs. Pickett (a tourist camping near by) came out into the sunshine and started washing the dishes. The prospect of a chat, after the boring hours of watching, was too good to miss. That is the only logical reason I can give for walking 50 yards over the grass, leaving camera and binoculars behind me, to talk to the Pickets." Soon after their conversation began, a large black undulating object began ploughing through the water along the opposite shore with white foam streaming from its back. Holiday continues, "I stared at this spectacle for about two seconds without speaking. The experience seemed curiously unreal and I remember registering the idea that I must be suffering from some form of hallucination." He was not, because the Pickett family and other witnesses all saw the same thing, but none of them had cameras

and as soon as Holiday raced back to his equipment, the object disappeared.

Frustration of this kind is common at Loch Ness, but what makes this occasion noteworthy is the fact that the monster not only appeared when Holiday had moved away from his camera for the first time in weeks, but that it chose the one small spot on the entire loch where trees and rocks would conceal it completely from the two other still vigilant cameras on the north shore. It first appeared on the eastern edge of this tiny blind spot and finally disappeared just before it would have moved into vision at the western end. This tantalizing and apparently omniscient behaviour on the part of monsters is familiar to watchers everywhere—and occurs just as often in investigations of UFOs.

Both monsters and saucers have occasionally been photographed at a distance, both have sufficient reality to be picked up on the screens of sonar and radar equipment and yet neither leaves behind any good material evidence that can be analysed and used to prove their reality beyond doubt. Monsters conveniently fade away at the crucial moment and saucers actually disappear like ghosts when observers get too close. Carl Jung correlated UFO reports with psychic manifestations and shrewdly suggested that both might in some way be connected in our minds, perhaps by a collective consciousness. He said that "the psychic aspect plays so great a role that it cannot be left out of account".[135] The French astronomer Jacques Vallée drew a similar parallel between UFOs and early European supernatural lore and noted that many accounts of flying saucer landings include all the classic manifestations of religious apparitions and the fairy faith.[274] He concluded that "the mechanisms that have generated these various beliefs are identical".

The similarity between traditional elves and some of the "dwarf entities" reported in UFO accounts, has been used to argue that saucers have been landing here for thousands of years, but the argument also goes the other way. The undoubted similarity can, perhaps more reasonably, be used to suggest that the UFOs were no more real then than they are

now. The merits of both physical and mental arguments are considerably diminished by the discovery that psychokinesis exists, that it is possible to produce physical effects at a distance by purely mental means. Some special people can do this well under almost any conditions, but the research suggests that many otherwise normal people can produce the phenomena in certain circumstances. Perhaps one of the necessary conditions is provided by the magnetic flaws that exist at special places. Perhaps fairies, dwarfs, elves, leprechauns, dragons, monsters, vampires, werewolves, ghosts, poltergeists and flying saucers all exist. And perhaps the cynics who say that it is all in the mind are also right, because all these things exist or are produced at the second or etheric level.

The strange behaviour of all apparitions suggests that they obey laws not quite like those of conventional physics, and that they probably belong to a reality with slightly different space–time references. The fact that those who come closest to these phenomena, usually receive information structured to support their own beliefs or fears, suggests that these apparitions cannot be entirely independent of the minds of those involved. Taken together, these two suggestions provide the basis for a concept that could account for a great many mysteries. The allocation of all these unexplained odds and ends to the already mysterious area of the mind, does not seem at first sight to be a very productive procedure, but I believe that the discovery of bioplasma and the possibility of its holographic action, make the mind more amenable to investigation than it has ever been before.

It is possible that these elusive phenomena may one day be objectively weighed, measured and arranged sufficiently tidily for even the most mechanistic scientist to regard them with equanimity. Some may take place, perhaps with the aid of electronics like television transmitters, at greater distances from the causal body than we had any reason to suspect, but it begins at least to seem clear that most must be produced directly by a living organism. I think it quite likely that Holiday's monster was created, or at least set up at that particular time and place, by his own unconscious. I begin to believe that we have the

ability to do things like that—and to make them sufficiently tangible to appear on film or radar. If this is so, then the weighing and measuring could be a long way off, because the power that can produce contrary manifestations of that kind will almost certainly lead us on a wild chase before it allows itself to be cornered and completely tamed.

The same talent also seems to be producing auditory manifestations. In 1959, Friedrich Jürgenson was recording the call of the Swedish finch in a forest near Stockholm when he discovered that his tape was also picking up other extraneous voice-like sounds.[137] He assumed that his machine had been damaged during the journey from the city and had it serviced before trying again a few weeks later. He recalls that "on playback I first heard some twittering of birds in the distance, then silence. Suddenly from nowhere a voice, a woman's voice in German: 'Friedel, my little Friedel, can you hear me?' It was as if the speaker had to make a tremendous effort to speak and the voice sounded anxious. But I am sure beyond a shadow of doubt that this was the unmistakable voice of my mother who . . . died four years earlier. That was how it began."

During the next few years, Jürgenson deliberately tried to pick up more voices and succeeded in recording sounds he believes were made not only by near relatives and friends, but by people such as Hitler, Göring and Caryl Chessman—all long since dead. It is not uncommon for electrical equipment to pick up stray radio or television broadcasts. Razors, toasters and even false teeth have been known suddenly to come to life with snatches of voice and music from the constant barrage of radiation that covers us like an electronic blanket. To rule out the possibility of random reception, Jürgenson began in 1964 to work with a research physicist, Friedebert Karger of the Max Planck Institute in Munich. Karger is satisfied that the voices exist on the tapes and are recorded even when every effort is made to screen out stray transmissions. Jürgenson next turned to the Central Office for Telegraphic Technology in Berlin, which demonstrated the reality of the voices by preparing visual prints from the tapes. These show all the normal characteristics of a human voice.

In 1965, Jürgenson demonstrated his tapes to the Latvian psychologist Konstantin Raudive who worked with him for a while and then, when he found that he could record the sounds himself, set up his own research project. In the next three years Raudive built up a formidable library of over seventy thousand voices on tape and wrote a highly controversial book that was published in German in 1969.[221]

There is no controversy about the existence of the voices; hundreds of independent researchers have now been recording them. I have done it myself. All you have to do is to run any kind of tape-recorder, attached either to a microphone or to a simple diode circuit like the "cat whisker" of an old-fashioned crystal set, in a silent room after making a preliminary announcement of some kind. Complete instructions and circuit diagrams are given in a recently published pamphlet.[240] I cannot deny that I feel very foolish sitting in an empty room saying "Good evening my friends in the Beyond", but it is equally difficult to deny that by doing so, one does get results. At first it is hard to avoid hearing only the tape hiss and white noise generated by the equipment itself, but playing the tape over and over again (preferably with earphones), almost everyone eventually hears voices. These have a peculiar cadence that takes some getting used to, but it is possible to identify them as male or female and to pick up successions of phonetic syllables.

The area in which controversy still rages, and rightly so, is the interpretation of these sounds. When freak pick-ups and random high and low frequencies are excluded by special electronic filters, the voices still get through. The chief engineer of a recording company in London has tried to stop the sounds without success and admits grudgingly, "I suppose we must learn to accept them."[11] Experiments made in the radio-frequency-screened laboratory at Enfield, and in sealed Faraday cages, still yielded voices and ended with an electronic screen suppression expert saying that "something is happening which I cannot explain in normal physical terms".

This leaves just two possible explanations. Raudive himself insists that he can understand exactly what the voices are saying and that they are communications from the dead. He claims

that the voices speak in five or six languages and have to use ungrammatical telegraphic sentences because it is difficult for them to talk in this way at all. The voices are certainly not easy to understand. If several people listen to the same segment over and over again and write down their independent interpretations, these sometimes match, but very often they will be totally different and perhaps even in different languages. When words can be distinguished with any clarity, they seem to use the names of those present, or of close friends, or to refer to circumstances known to those involved. Raudive and others argue that this proves that the communications come from the disembodied dead, but the same facts support an alternative explanation.

The disconnected, often banal, content of the speech is very similar to the thought patterns of dreams. Ten years ago one researcher suggested that the voices could be produced by electronic impulses sent out by the unconscious minds of the experimenters. At that time this possibility was discounted on the grounds that the mind could not send such signals, but now that we have seen psychokinesis in action under controlled conditions, it is no longer possible to be quite so dogmatic. There are physical correlates to many mental processes. Vast numbers of people move their lips even when reading silently to themselves, and there is so much activity in the larynx that many physicians forbid patients who have undergone throat surgery to read at all. It is certainly not impossible that the human body could make some kind of unconscious transmission.

Analysis of the voice phenomenon shows that the best results are obtained by those who are emotionally involved in the proceedings. Both those who desperately want to contact someone who has died, and those who most strongly resist belief in the reality of the voices, tend to be favoured with apparently personal communications. The nature of the messages is often well matched to the personality of those involved. The polyglot, strangely structured phrases on Raudive's tapes are an accurate reflection of his own style of speech. One meticulous recorder, and only this one man, now gets nothing but voices that seem to say "Go away!" and "Stop recording!" These links between the phenomenon and those present, are further strengthened by

the fact that we know psychokinesis works best on systems with some instability, preferably those already in motion. To record voices, despite the fact they they are inaudible to anyone present, the tape must be run through the machine. Nothing has ever been found impressed directly on to a stationary tape, and no recordings with voices have ever been made by a machine that ran quietly by itself in a screened enclosure or in an empty room. People must be present and, while they are, the possibility remains that they could unconsciously be responsible.

In the last year, Jürgenson has come back into the research picture with the claim that he has established a dialogue with the voices and held conversations with dead friends that were most intimate and personal.[137] This could be a strong point in favour of long-term survival, but I cannot help thinking that the unconscious may still be involved. All psychoanalysis after all is nothing but a dialogue between the conscious and unconscious minds of the same patient.

Perhaps the strongest argument in favour of the voices of the dead theory is the fact that some of them seem to speak in languages unknown to anyone present at the time they were recorded. If the unconscious mind of someone present can influence the tapes, then I suppose it is possible for the mind of someone else at a distance to do so telepathically, but I have the feeling that this is beginning to stretch the unconsciousness theory a little too far. There comes a point in this sort of progressive argument, when probabilities become inverted and unlikely alternatives end up looking relatively good. I have a sneaking suspicion that both theories may in the end turn out to be right in that experimenters are involved, but only as mediums for a voice source that originates at some other level.

The more I look into the phenomena that concern apparitions of all kinds, whether seen or heard or sensed in any other way, the more certain I become that none of these things occur in a vacuum. I believe that without the presence of a living body, and this may be strictly confined to the bodies of certain kinds of organism, it is impossible for an apparition to manifest itself in any way. It may even be impossible for it to survive at all.

Without the living, there may be no dead.

Chapter Eight

POSSESSION within other bodies

The trouble with ghosts is that there are so few of them. If indeed we do survive for any length of time, one would expect to have more apparitions around. The problem, as I have already suggested, may be that we simply cannot sense them except under special circumstances. Nobody has yet invented a "necroscope" which would make the dead visible and available for scientific inspection, perhaps because we still have no idea of the wavelength or energy level involved. If it is true that traces of the dead are somehow dependent on the living for their existence, then it will not be necessary to build such an instrument because we already have millions. The best way of detecting the disembodied dead may well be through the bodies of the living.

A fascinating sidelight on the voice phenomenon was the discovery that a Great Dane, who was present when the early experiments with Raudive were made in Englnd, was apparently able to hear the voices on the tapes long before any human could be sure that they were there. Peter Bander, who owns the dog, reported that he "would suddenly bark at some 'intruder', his bristles would stand up and he would make the same noises I would normally associate with a stranger approaching the house".[11] The range of human hearing extends from about sixteen to something like twenty thousand cycles per second, but a dog's sensitivity goes much further into the high frequency areas and it would have no difficulty in picking up the taped voices, which usually manifest themselves near our upper limits.

The different sensory bias of other animals may make ghosts much more readily apparent to them. A friend recently told me that she had a dream of walking from her bedroom through the living rooms of her house, past her husband who sat reading in a chair and then back to her bed again. When she awoke, her three cats were sitting on the foot of the bed staring at her with big eyes, and she learned from her husband that the trio had just done a grand circuit of the house along the dream route as though they followed in her footsteps. This apparent ultra-sensitivity on the part of other species was put to the test in a recent attempt to find some experimental approach to the survival problem.

Robert Morris of Duke University began his investigations into an allegedly haunted house in Kentucky with a collection of living detectors in the form of a dog, a cat, a rat and a rattlesnake.[186] Each of the animals was taken by its owner into a room in which a murder once occurred. The dog came just two feet into the room and then suddenly snarled at its owner and backed out the door. "No amount of cajoling could prevent the dog from struggling to get out and refusing to re-enter." The cat was carried into the room in its owner's arms and, when it reached the same point, leaped up on to her shoulders and dug in, then jumped to the floor and oriented itself towards an empty chair. "It spent several minutes hissing and spitting and staring at the unoccupied chair in a corner of the room until it was finally removed." The rat did absolutely nothing, but the rattlesnake "immediately assumed an attack posture focusing on the same chair". None of the three responsive animals produced a comparable reaction in any other room of the house.

The relative acuteness of the cat's sense systems may account for the fact that witches use them as "familiars", as aerials or extensions of their own senses for picking up subtle signals. We use bloodhounds as mediums for the interpretation of traces of scent totally hidden from our awareness. The world of smells is one of which we know next to nothing, but things could equally easily be concealed even from our paramount sense of sight, which also operates in a limited area. Our limit at the short wavelength end of the spectrum is imposed by the

slightly yellowish colour of the lenses in our eyes, which filter out the ultra-violet light. To our eyes, the green luna moth *Actias luna* is completely hidden against the green background of the leaves on which it sits, but to insects that can detect ultra-violet, it stands out as a brilliant spot of colour against a greyish leaf ground. As far as we can see, the male and female moth are identical, but to insects she looks fair and he appears dark.[66] Perhaps those people we call mediums, who are aware of things that we cannot see or hear, are simply individuals who by birth or training have stretched their sensitivity beyond our normal sensory limits.

I believe that the blockage that prevents all of us from being psychic lies not in the sense organs, but at the level of the computer that interprets information coming in from these systems. Eugène Marais, as usual working alone out in the field, produced some pioneer studies in what is now well known as hypnotic hyperaesthesia.[174] He hypnotized a young girl and found that she was able to taste quinine in water at a dilution of one in half a million, when the best she could do under normal circumstances was a solution four times that strength. When twenty people each handled a small object and placed it in a receptacle, she was able after smelling both the object and the hands of the people, to give each object back to the person who first touched it. Marais made a small machine that produced a sound like the hiss of a snake and found that his subject could hear it at a distance of over two hundred metres, when her normal limit was thirty. Even a baboon, normally hypersensitive to the presence of snakes, was not able to detect the hiss from more than sixty metres away. It seems that we normally receive far more information at an unconscious level than we need or can cope with, and that this is filtered by a programme in our mental computers which is designed to respond only to a more limited range of signals. With biofeedback techniques it is possible to train someone to become consciously aware of normally unconscious processes like small changes in blood pressure. Now that it has been shown that thinking about someone can produce such changes in that person even at a distance, it becomes possible to train a person to pick up telepathic com-

munications.[69] I suspect that all psychic sensitivity will prove to be susceptible to the same kind of training and that it will not be long before laboratories are churning out talented scientific mediums.

Until that time, a great deal can be learned from those who are naturally "sensitive". There are a large number of people who by speech or writing seem to be able to pass on to others information which they could not have obtained by normal sensory means. Most of these so-called mental mediums operate under some kind of dissociation. They consciously produce a trance state of variable depth. In some it takes the form of a detachment no more radical than that which most of us experience in a day-dream—and it is significant that many of us have had the experience of sudden enlightenment in this state.[104] It seems certain that the creative solutions which occur at these times are the result of upwellings from unconscious levels of the mind where wheels are always in motion. Much of the information provided by mediums is of the disconnected, incoherent kind that occurs in dreams and this strongly suggests that its source lies at least partly in the unconscious.

The head of the Psychiatric Department at St. Bartholomew's Hospital in London once produced an extraordinary script while in a trance state.[118] This was written upside down in German and claimed to be a communication from someone long dead, about whom the doctor knew very little. After the session, he looked the man up in his encyclopaedia and discovered that his script was an almost verbatim copy of the article there. We know that the unconscious forgets very little and that one casual glimpse at the book would have been sufficient to imprint it on his memory permanently. Professor Stanley Hall on one occasion received, through a well-known and reputable medium, a number of communications from a girl called Bessie Beales, who was a purely fictitious dead niece that he had invented for the purpose of the experiment.[67] There can be little doubt that many of the results obtained in dissociation have their origin in the mind either of the medium or of the sitter, but it is not possible to dismiss all the phenomena in this way.

Freud believed that personality was based on two opposing

forces, the conscious ego and the unconscious id, and that conflict between them was responsible for neuroses.[84] His system of psychoanalysis was in effect a kind of biofeedback training, because he tried to reconcile the opposing factions by bringing the unconscious force, often through the signals hidden in dreams, to the attention of the conscious. Ronald Laing goes a step further and suggests that these two forces are capable of being divided and separated.[155] He points out that most people have on occasions had the feeling of dissociation produced by stress or shock in which they felt somehow detached from their bodies. He believes that some people are more disposed to this experience than others and that they "do not go through life absorbed in their bodies, but rather find themselves to be, as they have always been, somewhat detached from their bodies". In this view, the phenomenon of separation is common to all of us, but those who identify themselves too exclusively with the part of them that feels disembodied, are considered to be schizophrenic.

Stan Gooch believes that the two forces have a physical reality and that they exist as independent self-conscious entities in different parts of the nervous system.[90] The cerebrum contains all the sensory areas that we associate with normal waking consciousness, but many of these are duplicated in the midbrain and the cerebellum. In more primitive vertebrates, the principal centres for vision and hearing were located in the hind regions of the brain and only later transferred to the forebrain "as though nature started out to make the cerebellum the highest centre of the nervous system but changed its mind and developed the cerebrum instead".[185] It is quite possible that the older cerebellum is the seat of the id or the unconscious mind.

Apart from dreams, there are several other ways in which the unconscious mind can intrude into conscious awareness. In brainwaves and insights this intrusion can be helpful, but it can equally easily be an unpleasant intrusion. The medieval idea of "raising the Devil" and the practice of "calling up spirits" in black magic, may be nothing more than techniques for deliberately bringing the unconscious into consciousness; and

the loss of control over this intruder from the back of the mind could be what is described as possession.

In all ages stern warnings have been issued against magic, ritual, drug and trance procedures because of the dangers said to be inherent in communicating with something that could turn the tables and take over control of those involved. This risk is even recognized by law in the notion of "diminished responsibility", which deals leniently with a person considered to have acted under the influence of powers greater than their own.

The barrier between the two parts of the mind seems to be a powerful and even a necessary one. When it is breached by the transcendent experience of religious conversion, the convert may make contact with the spirit of a god, but is equally likely to be visited by devils. Chemical bridges over the barrier can lead to good or bad trips. Mediums often communicate with spirits that seem to have nothing but good intentions, but they are all constantly on their guard against being possessed by an evil spirit. The conclusion that our personalities are naturally and inevitably divided, both by our anatomy and by our experience, seems inescapable. I think it not unlikely that mediums may turn out to be people who have barriers between the two parts of their minds that are more than normally permeable. The best mediums have conscious control over these gateways, but there are many who resemble schizophrenics in the fact that they have no dominion over the comings and goings of their minds.

We higher primates, perhaps because of nothing more than an evolutionary accident, have a waking consciousness and a view of reality dominated by our well-developed cerebral hemispheres. We conveniently label those whose view of the world is less firmly grounded in this particular area, as mad. Dolphins and birds have comparatively well-developed cerebellar areas and, if their senses are organized in this hindbrain as well as in the cerebrum, they may have a totally different concept of reality—one perhaps not greatly different from that enjoyed by mystics who have got the two parts of their minds together in other ways. Could this be the significance of John Lilly's

identification with dolphins[184] and Carlos Castaneda's confrontation with an albino falcon?[44]

In addition to his opposing forces of id and ego, Freud also suggested that there might be a third entity, the superego.[27] If it is possible for the id or unconscious to well up and take over control of the consciousness during possession, then perhaps the ego during this time actually moves to another area of the nervous system. Gooch again looks for a physical location and suggests that, as this interaction between the two old systems is comparatively new, the third one will be found in that area of the brain most recently evolved—the frontal lobes.[90]

Following this notion of a third level, we can suppose that possession means the domination of the unmoved consciousness, but that transcendence is the movement of the consciousness to a higher level as the result of the co-operation of the two formerly conflicting forces. Every mystical tradition and most of the new ideas about the growth of mind refer to higher states of consciousness and the techniques for getting there all seem to revolve around two things. The first is a method of knocking some kind of hole in the barrier between the conscious and the unconscious levels of mind and opening this door on demand and at will. The second and more difficult step is to reconcile the conflicting interests and capabilities of the two systems and to forge an agreement which allows some measure of co-operation between them.

This model of the mind is necessarily very simplistic. The variety of personality types (and the legions of demons in the annals of the occult) suggests that there are probably many channels in and between consciousness and unconsciousness. If two apparently independent personality patterns can exist within the same person, then there is nothing to prevent further splitting taking place. Multiple personalities can occur. "The Three Faces of Eve"[206] and the sixteen sides of "Sybil"[238] are two well-documented case histories that suggest some of the possibilities. There is nothing in either of these accounts which makes it necessary to assume that an outside agency is involved in the possession. A useful analogy is the one given by Gooch of a room containing a variety of illumination systems such as a

chandelier, a table lamp and concealed wall lighting.[90] One may light the room from any of these sources and each "will give the room a different character, and be respectively more suitable for particular occasions. One knows from one's own experience that lighting can create or dispel shadows, or give prominence to certain aspects of a room at the sacrifice of yet others. Nonetheless, it is of course always the same room."

I think that many of the phenomena produced by mediums in states of possession are the result of multiple intrusions of this kind from their own unconscious levels. We know that telepathy operates at that level as well, so it is not surprising that possessing personalities should bring with them information from outside sources, but sometimes this is so rich and detailed that the telepathic explanation begins to look a little strained.

Mary Roff died on 5 July 1865 at the age of eighteen. By all reports she was a strange girl, given to epileptic fits and pains in the head which she would relieve by bleeding herself. She is said to have had eyeless sight, being able to read books when blindfolded and letters still sealed in their envelopes. On 16 April 1864, just fourteen months before Mary died in convulsions, another young girl was born in the same town. Lurancy Vennum was perfectly normal for all of her first thirteen years, but when she reached puberty, strange things began to happen. The first was a cataleptic state that lasted five years and this was followed by irregular trances in which she described "angels" and "spirits". She was believed insane and handed over for observation to a specialist. He found that she was apparently possessed by two alien personalities—one a sullen, crabbed old hag and the other a young man who had committed suicide. Under hypnosis it was possible to restore Lurancy's own personality and in it she explained that there was only one way to keep the two evil spirits away, and that was to allow herself to be possessed instead by an angel that wanted to come to her aid. On being asked if she knew who it was, she said, "Her name is Mary Roff."[258]

Lurancy seemed to become Mary and was allowed to go and live with the Roff family. There she was perfectly happy, knowing every person and everything that Mary knew, recognizing

friends and neighbours and calling them by name, remembering hundreds of incidents from Mary's life, including the big ones like a trip to Texas and the little ones like sewing on a collar. She was even able to find things that Mary had hidden and about which the Roff family knew nothing. This possession lasted for three months and ten days, and then suddenly Lurancy returned and went back to live with her own family, whom she now recognized again.

There have been many cases of alternating personalities, but this one is special in that the personality which displaced Lurancy's was, by every test that could be applied, that of Mary Roff complete with all the memories that belonged to this eighteen-year-old girl who had died when Lurancy was only one year old. The Roff and Vennum families had no contact and there was no normal way Lurancy could have obtained the extensive and detailed knowledge of Mary's life that she demonstrated during her possession. After her return to her own personality, she knew nothing about the lost hundred days and never again had any problems of this kind.

The existence of fragmented and alternating personalities poses no great problems for psychology, but the possibility of invasion from outside can only be assessed by looking for biological precedents. For a biologist, one of the most appealing themes in science fiction is that of the *gestalt*, explored so beautifully by Theodore Sturgeon.[262] He starts one story with an awkward young man of great strength but limited intelligence who attracts others to him and forms the basis for a compound organism. To his "body" is added the "head" of a sensitive telepathic girl, the "hands" of a pair of psychokinetic twins, the "mind" of a mongol baby with the capacity of a computer and the "energy" of a psychopathic teenage criminal. Together this collection of misfits wield enormous but totally undirected power and seem destined to destroy themselves and all those around, until the organism becomes complete with the addition of the "soul" of a young poet.

This might well be the way in which human evolution will now have to progress. Environmental changes today take place so fast that there is no longer time for the normal leisurely

modifications of physical evolution. If we are to adapt and survive in some way, it seems that natural selection can only succeed if it acts at a mental level and one of the most productive directions could be that of the combination or *gestalt*. We can already begin to see the strength of psychological unity in the co-ordinated behaviour of a crowd.

Elias Canetti regards the crowd as an organism in its own right.[39] He distinguishes between random groups of people who just happen to be at the same place at the same time, and genuine crowds which develop around a focal point that he calls a crowd crystal. The formation and growth of crowds are certainly universal and still rather mysterious phenomena. They can occur anywhere. At one moment there may be a few scattered individuals, and in the next there is a concerted action in which the movement of some parts of the organism seems to transmit itself to all the others like the waves of nervous discharge in a jellyfish. The people who form a crowd often do not know what has happened and, if questioned have no answer, but they nevertheless hurry towards their common and invisible goal. A crowd in this state is a nebulous entity feeding on people. In its juvenile phase it is driven by only one instinct, the urge to grow. It wants to seize everyone within reach and it knows no limits, but in the formative period it is still a sensitive thing. Canetti says that a "foreboding of threatening disintegration is always alive in the crowd. It seeks, through rapid increase, to avoid this for as long as it can; it absorbs everyone, and, because it does, must ultimately fall to pieces."

The crowd organism exists for as long as it has an unattained goal. This may be a short-term one, such as a killing or the destruction of a building, or it may be as long-term as the vision of the Promised Land that kept the children of Israel together. Species of crowd can be classified according to the nature of their goal, but all have certain attributes in common. Within their bounds, individual people lose separate identities, names, economic and social status and become equal parts of the new being. This feeling is so strong that it is possible that all demands for justice and all theories of equality are based on the actual experience of brotherhood familiar to anyone who has ever been

part of a crowd. In its unusual density, all concepts of individual space are abandoned and all fear of touch and contact is lost in the new togetherness. In a dancing crowd, the individuals are fused into a single creature with fifty heads and a hundred arms and legs all thrashing in unison. The actions may be prescribed and ritual in some species of crowd that have been domesticated by war or religion. These are unusually long-lived organisms and, as a result, they become diluted, but the most powerful crowd is the spontaneous one that rushes together for instant gratification. This species reaches its goal quickly and, at the moment of discharge that signals its end, it often produces a sound. When the executioner holds up the severed head of the victim, the voice of the crowd can be heard. This unique cry, the call of the organism, expresses its unity more powerfully than any other action. It is a vivid demonstration of the fact that the community is something qualitatively different from the simple sum of its parts.

The force which combines individual people together into a crowd, is as mysterious as that which unites separate cells into a functional whole. It may be the same force that powers the etheric double and works at our unconscious level to produce the internal co-ordinating effects of acupuncture and the external manifestations of psychokinesis and poltergeists.

The best biological examples of individuals combining to form totally new organisms, are the lichens. These are plants that grow like coloured crusts or foliose clumps on tree trunks and exposed rock and provide the dominant flora in harsh mountain and tundra areas. They have specific forms and patterns and can be classified according to these characteristic colours and shapes, but every single lichen is composed of two totally distinct species belonging to separate botanical classes. One component is a green or blue-green alga and the other is an Ascomycete fungus, each rather fragile on its own, and yet together they form a symbiotic compound capable of pioneering territories where few other living things can survive. The algal part can live on its own, but the fungus cannot survive unless its spores land in a place where the photosynthetic algal partner is present and available for combination. I believe that in-

truding personalities in cases of possession play a role similar to that of the fungal component in a lichen and that, if it is at all possible for the dead to survive for long, then they have a similarly parasitic relationship to the living.

So far we have established the following facts:

Every living thing creates and is surrounded by a life field. This is an electrical phenomenon that exists at the normal physical level of the body and can be measured by standard laboratory equipment. It disappears at the moment of clinical death.

Each body also is accompanied by a bioplasmic counterpart that exists at a less physical level, takes roughly the same form as the body and is somehow involved in controlling and organizing vital functions. This is not as easily measured, but its existence is inferred from the practice of acupuncture, and it can be revealed by special techniques involving high-frequency apparatus. It does not disappear at the moment of clinical death.

Everything added to this substrate of fact must be largely speculative, but I think that we are justified in suggesting the following pattern:

Apparitions of the living are produced by the detached bioplasmic or etheric body which is visible all the time to certain sensitive people and to others under special conditions.[244]

Apparitions of the dead can be seen in the same way for a short time after clinical death, but the bioplasma body itself decays in time. So, if these apparitions persist for considerable periods after death, then it is necessary to assume that the bioplasma has been re-energized in some way, most probably by contact with another and complete living body.[272]

We have already seen what happens to a living cell taken away from its normal environment in the body. If properly cared for, it continues to grow and divide, but eventually it reaches the Hayflick limit, becomes totally anonymous and then dies. This degradation can be halted in two ways. The first is by restoring the cell to its original body. Ideally it should be put back in touch with its own tissue, but it seems that a lost cell can

regain its identity and vigour even if it is denied chemical contact with others of its kind. All it seems to need to "help it remember who it was supposed to be", is a transfusion with the right kind of energy. Experts in the culture of isolated tissue all know that the easiest cells to grow are those taken from their own bodies, and that these tend to thrive best if given a lot of personal attention. This is one of those persistent fragments of laboratory superstition that could turn out to be based, like the concept of a gardener's "green fingers", on fact.

The second way of giving an isolated cell a new lease of life is to induce a genetic change. If cells in a tissue culture go racing beyond the Hayflick limit, one can be almost certain that they have mutated—and become cancerous. This, of course, also sometimes happens to body cells while they are still part of an organism, but normally mutations are confined to reproductive cells, which are unique also in being the only living units that are deliberately isolated from the body. Human sperm cells, even in the optimal conditions of the uterus, cannot survive for longer than forty-eight hours, but the one that fertilizes an egg, and in doing so undergoes a genetic change, can start a culture that keeps on going for a hundred years. Both kinds of sex cell, the sperm and the egg, have half the usual number of chromosomes and one would expect this to limit their capacity for survival; but what does the fertilized egg have that enables it to go on living and dividing long enough to produce a completely new individual, when any other isolated body cell is subject to the Hayflick limit? Both have the normal number of forty-six chromosomes and access to all the necessary raw materials, but it seems that the egg has acquired some reproductive advantage simply by having mixed its genes with those of another. This benefit persists throughout its life and is recognized in biology under the name of heterosis or hybrid vigour—which is an increase in growth or fertility that occurs as a result of a cross between two genetically different lines. This advantage is so powerful that it must have played a major part in the evolution of sexual reproduction, but it cannot be explained by noting only that a mixture of genetic material has taken place. Something else has been added, but mystery still surrounds the

nature of this wonder additive that gives a fertilized egg its unlimited potential.

Mystics find nothing mysterious in this phenomenon. They simply assume that a discarnate soul comes along, takes up residence in the ovum and is reincarnated. The doctrine of reincarnation is a very persuasive one, providing ready solutions to so many philosophic problems and biological anomalies, but as a scientist I cannot adopt it simply because it seems expedient. I need to search for some corroboration that could make it acceptable to my intellect as well as my intuition. To mystics it appears futile to seek evidence for something that seems to be self-evident, but I find that the search itself, even if it should be unsuccessful, brings understanding that can be gained in no other way.

One of the few scientists ever to bring the techniques of his discipline to bear on reincarnation, is the psychiatrist Ian Stevenson of the University of Virginia. His involvement began when he submitted the winning essay entitled "Evidence for Survival from Claimed Memories of Former Incarnations" in a competition in honour of the pioneer psychologist William James.[259] In this he neatly turned the tables on most previous thinking about survival with a new experimental approach. He said, "In mediumistic communications we have the problem of proving that someone clearly dead still lives. In evaluating apparent memories of former incarnations, the problem consists in judging whether someone clearly living once died. This may prove the easier task."

Stevenson accepted the task and went on to make a very careful analysis of almost a thousand cases of alleged reincarnation and from these picked twenty that he thought worth further investigation.[260] He personally followed up seven cases in India, three in Ceylon, two in Brazil, seven in Alaska and one case in the Lebanon. Of all these, I find that involving the Lebanese boy the most interesting because Stevenson discovered it himself and was able to be with the child when he was first taken to the village in which he seemed to have spent a previous life.

From the moment he was first able to speak, Imad Elawar seemed to know things that nobody had ever taught him. He

mentioned by name a number of friends that his parents did not know and they dismissed them as fantasies until one day the child rushed up to a stranger in the street of their village Kornayel and hugged him. The puzzled man asked, "Do you know me?" and Imad replied, "Yes, you were my neighbour." The man lived fifteen miles away across the mountains in the village of Khriby. From that moment, Imad's parents began to take him seriously and by the time Stevenson arrived in Kornayel, to investigate another case altogether, they had concluded that Imad was once Mahmoud Bouhamzy who had been married to Jamile and had been run over by a truck, had both legs broken and later died as a result of his injuries. Stevenson made a list of everything the parents claimed, and as far as possible tried to separate this from what the boy had actually said. Then he and the five-year-old child went to Khriby together.

There is very little contact between the two villages and when they arrived there, Stevenson discovered that Mahmoud Bouhamzy did indeed live there, but that he was very much alive. However, he learned that one Said Bouhamzy had in fact died in the way the boy described and that this man's closest friend was his relative Ibrahim Bouhamzy, who was much affected by his friend's death and who himself died later of tuberculosis. Ibrahim had never married, but he had a mistress named Jamile and was a neighbour of the man Imad had recognized in Kornayel. Stevenson investigated the house in which Ibrahim had lived and found sixteen correct references to things like a small yellow car, two sheds used as garages and an unusual oil lamp.

Stevenson's notes show that Imad had not actually said that he had been the victim of the truck accident, but merely that he remembered one vividly. He had spoken fervently of Jamile, even comparing her favourably with his mother, but never claimed to have been married to her. The errors of inference made by Imad's parents serve in fact as an indication of their honesty and make it extremely unlikely that they built up the whole thing as a fraud, or that they were the unwitting channel by means of which Imad received his information about

Khriby. On the basis of the facts of the case, it seems that the memories of Imad bear a relationship to the experiences of Ibrahim that cannot be accounted for by chance, fraud or normal memory.

Stevenson says, "We have left as serious contenders to explain it either some kind of extrasensory perception plus personation (whereby information gained by ESP is moulded into a dramatic personal form), possession (by a spirit entity, presumably that of Ibrahim), or reincarnation."

The distinction which Stevenson draws between possession by a spirit of the dead and reincarnation, seems to me to be unimportant. Reincarnation is in effect permanent possession and if multiple personality and complex possession is possible, I see no logical reason why more than one soul should not become incarnate in the same body at the same time. This leaves just two possibilities; either Imad is telepathic or Ibrahim has been reincarnated.

In the light of controlled experiments between pairs of people in apparent contact with each other at a distance, telepathy works at an unconscious level.[286] One of the best ways of making contact with this area of the mind and of gaining access to information there, is by hypnosis. Denys Kelsey gives the example of a teenage girl whom he hypnotized during a course of psychotherapy that arose out of her fraught relationship with her parents.[145] "Simply to provide a starting point for the session, I asked her the name of her favourite tune. 'I don't know any,' she replied. This surprised me, because one of her mother's complaints had been that her daughter spent far too much money on gramophone discs. I asked her how old she was. 'I'm five,' she said, and then burst into tears." The girl had spontaneously regressed to a moment in her childhood that proved to be a key experience in her present inability to cope with her parents. This is unusual, but regression is frequently initiated under hypnosis by a deliberate and specific suggestion from the therapist.

In regression, most subjects can remember early events in their lives with such clarity that they seem actually to live through them once again. There is apparently no biological

limit to the extent of the regression, many people recalling sensations and emotions going back to the moment of birth and some even to prenatal experiences. Sometimes these demonstrations look very unconvincing, but if one gives regressed subjects the standard intelligence tests, they hit the proper mental age with considerable accuracy—and this is very difficult to fake.

Whatever the reality of the phenomenon, there is no doubt that the technique can retrieve repressed memories and sometimes release entirely unsuspected talents. The Moscow psychiatrist Vladimir Raikov has used it to help students produce creative abilities in art and music.[208] Rachmaninoff's famous Second piano concerto was written after a similar session and is dedicated to his hypnotist. Working with Raikov is Victor Adamenko, a physicist who has invented an instrument which uses a strategic combination of acupuncture points to measure the intensity of bioplasmic energy in a body. They find that this registers dramatic changes that make it possible to distinguish the ordinary levels of hypnosis from those achieved during regression. There is a measurable physiological difference—very like that produced when the subject is in the act of receiving telepathic communication. It appears that both regression and telepathy take place in the bioplasmic body.

In a few cases, hypnotists have managed to regress their patients beyond the moment of conception and into a world of memories that seem to belong to another life. Kelsey now uses this technique as a standard form of psychotherapy when he can find no relevant episode in a patient's memory of this life to account for a particular stress or phobia.[145] I find one of his cases particularly interesting because the subject, who was being treated for alcoholism, was intelligent and rather cynical about the whole subject of reincarnation (not that there is necessarily any connection between the two traits). He was hypnotized and regressed and immediately went into a spasm in which he seemed to be trying to escape from bonds which held his arms in a spread-eagled position while he groaned and gasped, "They are cutting my tongue out!" It proved very difficult to bring him back to normal waking consciousness, but as the spasm passed he shouted for water and more water and only when he

returned fully to the present, was his thirst quenched. Kelsey believes that this man's craving for drink goes back to a previous life, apparently in the Spanish Civil War, where he was tortured and left to die in pain and thirst. The patient was told the diagnosis and, although he still remains sceptical about reincarnation, he has lost the compulsive need to drink and is now teetotal.

Referring to the use of hypnotic regression as a method for investigating reincarnation, Stevenson says, "The personalities usually evoked during hypnotically induced regressions to a 'previous life' seem to comprise a mixture of . . . the subject's current personality, his expectations of what he thinks the hypnotist wants, his fantasies of what he thinks his previous life ought to have been, and also perhaps elements derived paranormally."[260] I have no doubt that the conscious mind, with the aid of talents hidden in the unconscious, can produce all kinds of convincing amateur dramatics, and I suspect that some at least of the paranormal elements are received telepathically; but this leaves some data that still point towards the possibility of possession. The subjects of nearly all investigations into reincarnation have their own distinct personalities in addition to the traits and memories of others now dead. I suspect that Stevenson's dilemma over young Imad Elawar and the question of telepathy or reincarnation, might best be resolved by the answer—probably both.

Modern depth psychology believes that there are resources of wisdom hidden deep in the human psyche. Jung was certain that "rebirth is an affirmation that must be counted among the primordial affirmations of mankind" and that "there must be psychic events underlying these affirmations".[130] In one of Plato's dialogues, Socrates indicates that teaching is not a matter of something being placed in one person by another, but of eliciting something already present. He was not interested in drawing out the petty things like names and dates that we retrieve under hypnosis, but "traces of knowledge garnered by the soul in its timeless journey".[111] There are notions of reincarnation in Hindu, Jain, Sikh, Buddhist, Tao, Confucian, Zoroastrian, Mithraic, Manicheist, Animist, Jewish, Christian,

Muslim, Masonic and Theosophical beliefs. In western philosophy alone it crops up in the works of Hume, Kant and Schopenhauer as palingenesis, metempsychosis and transmigration.[112] No other single notion has ever received so widespread a cultural endorsement. It could be argued that this in itself might have kept a meaningless concept alive for a long time, but the belief stems from so many diverse and culturally unconnected origins, that I cannot believe it has no basic biological validity. The problem is finding proof.

The best possible evidence for reincarnation would be proof that a person now living has the same mind as that of a person whose body died some time before. The philosopher Curt Ducasse points out that the body of an old man may be totally unlike that of the same man when he was young and that the difficulty of identification can only be overcome if it can be shown that the young body has become the old one.[67] The same problem would apply to the mind and it should be considered that "a mind at a given time is 'the same mind' as one at an earlier time if and only if the mind in view at the earlier time has become the mind in view at the later time." This could only be proved by demonstrating that the present mind contains memories of subjective experiences enjoyed by the old one. Many of the supposedly reincarnated minds investigated by Stevenson contain information of this kind, but because it relates to subjective experiences, which by their very nature would not have been recorded in the past, it is impossible to verify them. The best possible proof of reincarnation is therefore impossible and we have to settle for second best.

I am prepared to accept the kind of evidence which would cancel out any possibility of telepathy or unconscious memory, as proof of survival. If it can be shown beyond doubt that someone living now has information or an ability from a previous time that is possessed by nobody else alive at this time, then they must have obtained it from an entity that has survived from that time. This would of course be proof that could support either reincarnation or spirit possession, but I think that distinction is at the moment unimportant.

Frederic Wood, a doctor of music living in Blackpool, was

already interested in a local girl when, in 1931, she began while entranced to use words in a strange language. The girl, known only as Rosemary, was a channel for communications that seemed to come from a woman who had lived in Egypt during the Eighteenth Dynasty under Pharaoh Amenhotep III, whose dates we know to have been 1460 to 1377 BC. The spirit identified herself as Telika-Ventiu, the Babylonian wife of the pharaoh and explained that she was able to talk to Rosemary in the old language because the girl had herself once been a young Syrian slave who served as a temple dancer until the queen rescued her and kept her as a handmaiden, and that the two had been drowned together in the Nile while fleeing from the wrath of the priestly establishment. Melodramatic accounts of this kind are common in the literature on reincarnation and they are quite properly a cause of concern. If reincarnation does occur, it is difficult to understand why so many of those who survive should be ancient Egyptians of high stature or North American Indian chiefs, but this criticism is unimportant in Rosemary's case because she was really producing words in an old Egyptian language.

Wood copied down a number of phrases and short sentences phonetically and sent them to the Egyptologist Howard Hulme for translation. Hieroglyphics, with the exception of the shape for the sound of "Y", represent only consonant letters. No living person knows how ancient Egyptian was spoken, because the vowels have to be guessed at by comparison with the distantly related Coptic forms and pronunciations. Few Egyptologists agree even on the number and arrangements of letters in the hieroglyphic alphabet, but all concede that the missing vowels could make a difference and change the meaning of words altogether. When the vowel sounds were omitted from Rosemary's words, what was left was still intelligible to Hulme. He says, "It is difficult to show and explain . . . the purely technical and most convincing features: such as period characteristics, survival of archaisms, grammatical accuracy, peculiar popular terms, ordinary elisions and figures of speech . . . but they are very evidential."[291] He was convinced.

It is possible that the communications are indeed based

on the lost language of the hieroglyphs and contained additions which were unfamiliar to them, who knew it only in its written form. The question was raised of the possibility of Rosemary having made a study of hieroglyphics and invented her own vowels, but this seems to be negated by the speed with which she was able to produce sentences in apparently meaningful reply to spontaneous questions. No living person can speak ancient Egyptian and even the experts cannot read it directly without solving each word like a cryptogram by a laborious process of trial and error. Yet Rosemary was able to give Hulme sixty-six accurate phrases in old Egyptian during a sitting of just ninety minutes, in reply to a set of twelve questions in that language that had taken him twenty hours to prepare.

The reality of the Syrian slavegirl and the Babylonian princess is still open to question. There is certainly no mention of them in any ancient papyrus of the time of Amenhotep III and we have no other way of proving that "someone clearly living once died". But in a sense this does not matter, because we seem in this case to have very good evidence of survival, regardless of the actual mechanics involved. My evidential criteria have been satisfied in that someone living was able to demonstrate an ancient ability possessed by nobody else alive at the time.

Joan Grant is an English author who has written several vivid historical novels.[145] She is also able consciously to enter a trance state which she calls "far memory", that enables her to relive parts of what she believes to be her earlier incarnations. These occur to her in such detail that they now form the substance of several complex books on characters as diverse as a Roman matron who committed suicide in a marble sarcophagus, a medieval girl who was burned at the stake as a witch, and a minstrel who played the lute in sixteenth-century Italy. While dictating an episode in the latter life, Joan Grant vomited several times and explained that her distress was caused by the overpowering smell of a woman suffering from smallpox. A visiting doctor who had worked extensively with smallpox cases, insisted that she must be mistaken as the disease had no such distinctive smell, but some time later he sent her an article on a rare type of smallpox that had appeared in the Middle East

and could be distinguished from all others by "a specific stench which once smelt can never be confused with any other."

Grant believes that "the body of every individual has a physical and a supra-physical component; and when the energy-exchange between these two components ceases to exist, the physical body dies. But the supra-physical body does not die." In this, she seems to be very close to the concept of bioplasma, but she suggests that the supra-physical body cannot die because "it consists of an order of matter which is not subject to the process which we call 'death', a process during which the physical particles integrated by an energy-field disintegrate because the energy-field has become inactive." She sees survival as being in the hands of something called the "Integral", which is a sum total of all the wisdom acquired through a whole series of incarnations, that decides which of a collection of past supra-physicals should become alert and take on a new fertilized ovum. The sex and skills and some of the irrational likes and dislikes of any individual are, she believes, produced directly by the action of this particular organizing supra-physical on the genetic raw material contained in the egg.

This is an attractive and far-reaching construction, based on a large amount of personal experience and as comprehensive as any theory advanced to explain survival, but it does not encompass all the known facts. It presupposes that every living individual must be the product of at least one other previous life, but on the evidence available to us we have no reason to assume that reincarnation is anything more than a rare and exceptional occurrence. Joan Grant's husband is the psychiatrist who uses hypnotic regression to former incarnations as a psychotherapeutic tool, and he admits that "among those in whom I thought a previous personality might be relevant, only a small proportion have been able to recall a single episode". In most respects, Joan Grant's presumed supra-physical body corresponds directly to the nature and behaviour of the newly discovered bioplasmic body. We know that bioplasma seems to survive the removal and destruction of the somatic system, but that it in turn decays in time, so it seems fair to assume that she

could be wrong about her supra-physical never disintegrating. On physical and biological grounds it would appear to be more likely that the organizing field that carries the characteristics of individual memory and experience, perhaps of more than one life, would ultimately be dependent on energy and that this can best be provided by a living body.

Grant says that a ghost is a "dissociated fragment of a personality which has . . . only a limited amount of energy and this will eventually run down, so a modern building is far more likely to be haunted than a medieval dungeon." This makes a great deal of sense and, if we add to this comment the observation that many apparitions seem to be rather simple-minded and seldom do anything more than repeat the same actions over and over again, we arrive at what seems to be the justifiable assumption that little or nothing can be added to or removed from a personality in its disembodied state. It is possible that discarnate bioplasmic fields can briefly touch living bodies, leaving them with the fleeting impression of having seen or felt a ghost, and by doing so become sufficiently recharged to continue for a while. It is also conceivable that they are doomed to continue in this way unless they come across a body in a sufficiently dissociated state for them to possess it, or a newly fertilized ovum in a sufficiently receptive state for them to be reincarnated. Or until they become totally discharged by holy water or some other form of ritual exorcism.

Taking this line of conjecture a stage further, it seems reasonable to assume that the revitalizing charge should come from a living body of the same species, but that a desperate bioplasmic entity could manage to derive some succour from any other convenient warm-blooded mammal. There is room in this notion to account in passing for the persistent vampire tradition (demanding bioplasmas once belonging to unscrupulous people) and for werewolves (bioplasmas forced by the absence of man to feed on his best friend). It is also possible that our species is not the only one to produce detachable fields and that there may be reinforcement between disembodied human systems and recombination with other non-human bioplasmic flotsam and jetsam. This would help account for the amorphous and horribly mixed

part-human apparitions that appear from time to time even outside Gothic horror stories.

All these admittedly far-fetched suggestions leave us with an hypothetical situation in which disembodied bioplasmic fields mill around more or less aimlessly after clinical death and either attenuate and disappear, or else find some other way of surviving for longer periods. We know from many anecdotal and a few controlled tests that it is possible for some sensitive people to hold an object and give vivid and apparently accurate pictures of its former owners.[286] This talent for what has been called psychometry seems to be very real, but it may be purely incidental to the bioplasmic phenomenon that makes survival possible. If charges of electrical energy can be stamped permanently into the wax of a gramophone disc, if magnetic impulses can be trapped for later playback on a wire; then it is not unlikely that patterns of bioplasmic energy can be preserved in the crystals of gems or metal with which they have been in close contact. And if this is possible, it does not seem to be stretching the potentiality of nature too far to suggest that this same energy built up by a living body could, if it finds a suitable living substrate in the right condition of receptivity not too long after its own clinical death, become re-embodied.

I feel that the duality of living bodies; the detachment of the component parts; the survival of one without the other; and the recombination of these parts following separation in time or space—all emerge as distinct biological possibilities.

Chapter Nine

MIRACLES and other realities

We take miracles so much for granted these days that it might be difficult to recognize a new Messiah. People are being raised from the dead every day by the new techniques of resuscitation. One patient who "died" more than ninety times in the coronary care unit of a New York hospital, today lives a normal active life, yet nobody refers to his survival as a miracle.[888] Admittedly he wears an electronic pacemaker and this visible reminder of the role played in his treatment by technology provides us with a convenient material peg on which to hang our credulity. But there are those who still carry out similar feats without mechanical aids.

On a recent visit to India, I saw a man perform almost every miracle ever credited to Christ. Satya Sai Baba is an unlikely messiah. Tall and slim with a bushy black Afro hairstyle, he moves slowly through the crowds that gather around his ashram near Bangalore, dressed in a long red silk robe, dispensing health and wealth almost indiscriminately. He turns rock into sweets, changes flowers into jewels, produces showers of sacred ash from the air in quantities sufficient to fill huge drums, and he heals by touch and at a distance. I did not have the opportunity of investigating him closely, but Howard Murphet has worked for some time with Sai Baba and is convinced that no sleight of hand or deception is involved.[183]

Whatever the reality of his actions, it is fascinating to watch the reactions of his followers, who are seeing almost exactly what the multitudes must have witnessed on that mount in Palestine

two thousand years ago. Hundreds of thousands of people who have seen Sai Baba, believe that he is the earthly incarnation of a deity. Belief of that order comes easily in India where reincarnation is seen as a fact of life, but what would the response to him be like in the West? I know that if Sai Baba made a well-publicized tour of the capital cities of Europe, or a full-length film of his talents was transmitted at peak viewing time on American network television; he would excite less interest than a royal wedding. Instant cures of blindness and paralysis, dramatic reprieves from illness and death, are being made every week at Lourdes, Fatima, Madison Gardens and the Albert Hall, but they no longer rate even a passing mention in the press.

Every now and then the British or American Medical Association rouses itself and proclaims "we can find no evidence that there is any type of illness cured by 'healing' alone which could not have been cured by medical treatment."[226] The professionals conveniently ignore the fact that most patients turn to the various kinds of treatment available on the fringe only when orthodox medicine has failed to help them, and they steadfastly insist that the nature of the disorder cured must have been incorrectly diagnosed, or wrongly attributed to an organic cause when it was really hysterical in origin. But the one thing that no physician dares do, for the evidence against him is now overwhelming, is to deny that healers without medical qualifications can and do effect cures.

A French student of pharmacy at the end of the nineteenth century was surprised when a patient suffering from an apparently intractable disease, took a new patent medicine on his advice and was promptly cured.[127] He was even more surprised when he analysed the medicine and discovered that it was a harmless compound whose whole value was based upon "the involuntary eloquence with which he himself had advised the use of the remedy, and upon the patient's confidence in him and his word". Emile Coué came to the conclusion that his influence must have been of the kind that sometimes occurs under suggestion in hypnosis, but that the patient was in the end responsible for his own cure. He decided that all medicines were probably

similarly worthless and in 1910 set up a clinic in Nancy to teach treatment by what he called "auto-suggestion". It was he who coined the catchphrase "every day, in every way, I get better and better", and for years his system enjoyed enormous popularity, but eventually it went the same way as that other contemporary fashion for phrenology.

Today we know more about the prevalence of psychosomatic effects and it is generally conceded that a man can with his own mind make himself ill or well. The origin of many symptoms in the mind, which is an area few physicians know anything about, accounts for the common phenomenon of syndrome shift. Michael Balint quotes the horrifying example of a man who was treated in succession by thirty-four specialists and was still ill, "although it is beyond doubt that, for instance, the surgeon who operated on his anal fissure, the orthopaedist in charge of his crushed vertebra, or the neurologist diagnosing his jerks, had closed his case as finally dealt with, possibly even as successfully treated."[10]

At the University of California, Alberto Marinacci has taken in hand a number of patients suffering from paralysis that has no known organic cause. He appeals directly to the unconscious minds of these bodies by using biofeedback techniques to reveal dormant muscle functions. Some have already taken up their beds and started to walk. At the Veterans' Centre in Los Angeles, Maurice Sterman uses a similar conditioning technique to train victims of severe epilepsy to recognize the symptoms that herald the onset of a fit and to control and prevent them taking over.[278] Stephen Black concludes that of all "the ills mankind is heir to, at least half have always been psychosomatic".[20] This disposes of faith healers as little more than switches that turn people's power on or off, but it begins to look as though we could now be putting too much emphasis on the patient's mind, because evidence is coming in to show that healers can be people with exceptional and transferable power of their own.

At McGill University in Montreal, Bernard Grad has been breaking entirely new ground with a series of elegant tests.[91] He started by treating barley seeds with salt and then baking them in an oven for long enough to injure the seeds and seriously

jeopardize their ability to germinate. The barley was then planted out into pots and water. Some pots were given untreated tap water, but others were fed on the same water only after it had been held for thirty minutes in a sealed glass flask, between the hands of a well-known healer. The experiment was arranged in a double-blind fashion so that the healer never saw the plants and the person caring for them never knew which bottles of water came from the healer and which directly from the tap. Two weeks later, when the intricate layout was unravelled, it was found that the barley seeds that had received the treated water showed a higher germination rate, taller growth and a greater yield than those in less privileged pots.

The key to this effect lies in the fact that water is composed of highly unstable molecules held together by chemical bonds only ten per cent as strong as those in most other compounds. These links are rather fragile and it seems that they become distorted in the hands of a healer. It is possible for a skilled molecular chemist given nothing but two samples of pure water, to distinguish between them purely on the basis of these alterations in the nature of their atomic bonds. Science is indeed wonderful, but it loses some of its magic when we discover that there must be an equally sophisticated laboratory in action in every barley seed.

Most of the body weight of living organisms is made up of water and all biochemical processes take place in an aqueous medium, so the healer could exercise his power entirely through his control over this basic ingredient. Justa Smith of Rosary Hill College in New York has taken the causal chain one link further by showing that a healer can influence organic molecules equally easily.[249] For her first test she chose to use the enzyme trypsin which is produced by the pancreas to assist in the digestion of proteins once they reach the duodenum. Trypsin was isolated and kept in sealed flasks over the eleven day period of the tests. Each day the Canadian healer Oscar Estebany held one of these flasks between his hands for seventy-five minutes and then the trypsin was given to another researcher who tested its potency by feeding it on raw protein. The results showed that the healer had "stimulated the enzyme dramatically", because

it devoured the provided protein far more rapidly than trypsin kept in control flasks that were left untouched, or handled by subjects without known healing abilities.

Smith was not unduly impressed by this result and decided that it was necessary to demonstrate not only that biochemical reactions could be influenced from outside, but that they were affected in ways that would be beneficial for the body bearing them. In the next experiment she tested the "intelligence" and discrimination of the healing hands by giving them custody of the enzyme nicotineamide-adenine-dinucleotide (NAD). This enzyme is one of a pair that remove hydrogen from carbohydrates to prepare them for the action of other enzymes. In a pure solution without the necessary biochemical checks and balances, this action takes place very quickly, but in a living body it is vital that it should be more carefully controlled. After the NAD in the flasks had been exposed to healing influences, its action on carbohydrate in the tests was suitably controlled. The enzyme was appropriately retarded instead of being indiscriminately encouraged. If there was no discernment of this kind, healers could produce runaway cancer while trying simply to repair a minor wound.

Still not totally satisfied with these results, Sister Smith made one final series of tests. This time the enzyme she chose was the combination amylase-amylose which is involved in the breakdown of glycogen that is stored in the liver and muscles and released into the blood stream as glucose when and as it is needed. If there is too much activity by these enzymes, the concentration of sugar in the blood soars and the organism becomes diabetic; if they under-react, blood sugar falls and the patient suffers equally badly. So, for optimal effect on the normal person, there should be no change in the reactivity of these enzymes after being exposed to the effects of healing. There was none. Smith concluded that "human thought can generate a force that heals. And this force is marvellously selective in its effects on specific body processes."[248]

Grad carried the work through the next essential step by demonstrating that biochemical changes like these could be induced in an intact animal.[92] He prepared three hundred mice

by giving each of them an identical minor injury produced by nicking a small piece of skin off the back. Under normal circumstances, one would expect to find a range of healing times spread throughout the population, determined by the health, age, sex and social position of each individual. What Grad discovered was that those mice held in the hands of a recognized healer for fifteen minutes each day, all healed far more quickly than mice held for the same period under the same conditions by other experimenters. It seems that there really is something in, or coming out of, the hands of healers that sets them apart from other people.

Thelma Moss at the University of California is using her high frequency apparatus on the Israeli healer Yehuda Isk to try and localize this talent.[187] She says that everyone's hands produce pictures that show a glowing aura, but that "the healer's corona is qualitatively different", and when he is actually healing there are dramatic changes in the pattern. In one test she compared the effect produced on a potted plant by the healer, with that produced by someone who claimed to have no talent for gardening. The "green fingers" of the healer left glowing prints that flared wherever he touched the leaf, while the "brown fingers" of the other subject left a trail of dead areas in which the lights of the bioplasma had been entirely blacked-out.

There seems to be every reason to assume that the healers who are conspicuously and frequently successful, all have this measurable physical ability. Harry Edwards in Britain, Fra Pio in Italy, Oral Roberts and Kathryn Kuhlman in the United States all claim to be able to heal by the power of prayer. It may well be true that they act only as conduits for the healing force, but it seems certain that they hold at least part of the secret of success in their own hands.

If the source of health and healing lies in the bioplasma and, if every person's pattern is unique, then one would expect the characteristics of this pattern to be useful in diagnosing different kinds of disease. This is apparently true. The British medium Bertha Harris is one of those who can see the aura with her naked eye. She tells of seeing recently that there was a double aura surrounding one of the eggs in her shopping basket.[188]

'When I cracked it into the pan, there were two yolks and I noticed that the egg was fertile. Without the two yolks, the egg would not have had two auras, and if it had not been fertile there would have been no aura at all." She is able in the same way to detect pregnancy even in its earliest stages and to see the presence of twin human embryos long before this is possible by normal medical means.

Many sensitive people claim to be able to read the aura in this way, but their ability has seldom been put to an objective test. The neuropsychiatrist Shafica Karagulla is in the midst of a long-range programme of research into this phenomenon in California and has already produced some fascinating results with a particularly good subject called Diane.[139] She apparently detects a "vital or energy body or field which sub-stands the dense physical body, interpenetrating it like a sparkling web of light beams". As Diane describes this pattern, it sounds rather like a television picture that has slipped out of focus so that every body is surrounded by a ghost outline that extends an inch or two from its surface. She can also see right through the body and pick out the shape and pattern of most of the major organs. Her descriptions of these are those one would expect of a layman, but they are accurate and easily translate into medical terms.

For her first tests, Karagulla selected patients with confirmed medical diagnoses and then asked Diane to describe what she saw in detail. "She described the actual physical condition which turned out to be entirely accurate in all cases." But Diane did not stop there, she also described the appearance of an energy body in which she could see spiral vortices. Diane's account of these tells of seven or eight spiral cones of light that exactly correspond with the traditional *chakras* of yoga. She says that if any of these cones seem distorted or are even missing altogether, then she looks for some pathological disturbance in this area. Following this discovery, Karagulla decided that she needed first to map this energy body in healthy people in order to have a basis for comparison in the case of disease, but she found that it was difficult to locate completely healthy subjects. One man chosen for his apparently robust good health was said

by Diane to have major disturbances throughout his body. He was advised to have a complete medical check, which found nothing amiss, but eighteen months later he developed the severe type of nervous degeneration known as Parkinson's disease.

Karagulla devised an experimental procedure to guard against the possibility of Diane picking up any information about a patient telepathically. They would both go into the out-patients' department of a large New York hospital and pick a patient at random by deciding beforehand to choose the one in the seventh seat from the door or the next one to sit in an empty chair. Diane would then start at the top of the head and work all the way down to the feet describing exactly what she saw into a tape-recorder. Her diagnoses would then be checked against that patient's hospital record.

When Diane reported that the bones looked "crummy" and that the throat vortex was grey and lifeless, the patient turned out to have Paget's disease (a disorder of the skeleton usually detectable only by X-ray) and a deficient thyroid gland. When she told of "irregular and jerky" patterns over the solar plexus and a "dark" pituitary, the hospital diagnosis was Cushing's syndrome (a disturbance of the adrenal glands which is often related to a malfunctioning pituitary). When Diane thought that the energy field around a head was "thicker" on one side, it turned out that the patient was an epileptic whose right temporal lobe had been surgically removed. When Diane described a blockage in the large intestine, this diagnosis was only later confirmed by X-ray and the woman underwent surgery three days afterwards for an obstruction in the colon.[139]

It is impossible to attribute these successful diagnoses to chance and, in those cases where neither the patient nor the doctor was yet aware of the condition, telepathy could have played no part. Diane, and others like her, can "see" patterns invisible to most of us without special equipment, and in every case these patterns seem to be directly connected to that energy body that yogi philosophers describe as the place of *prana*, that acupuncture manipulates through sensitive meridia, and that

high-frequency apparatus reveals as bioplasma. And it seems that the physical condition of the body is not simply mirrored in this pattern, but is perhaps even preceded by changes at this energy level.

In the field of medical diagnosis, the most rapid assessments ever made are those credited to an uneducated ex-miner in Brazil. José de Freitas, better known by his nickname "Arigó", died in 1971, but in his last fifteen years he alone treated more than two million people.[83] In a shabby building next door to a hotel in the little hill town of Congonhas do Campo, each day a thousand or more sick people would file slowly past Arigó as he sat at a table, glanced briefly at each of them and wrote rapidly on scraps of paper. These scraps turned out to be detailed medical prescriptions in Portuguese or German and, when fulfilled by a pharmacist, proved totally appropriate for the patient in question.

An investigation of Arigó was carried out in 1968 by the New York neurologist Andrija Puharich and a team including six doctors and eight other scientists. They ran one thousand patients past him and without touching any, and taking an average of less than one minute per patient, Arigó unhesitatingly delivered one thousand very specific diagnoses and for each, a suggestion of an appropriate treatment.[84] Puharich says, "We found we were able to verify 550 verdicts, because in those cases we ourselves were able to establish a pretty definite diagnosis of what the problem was. In the remaining 450 cases, for example in rare blood diseases, we could not be certain of our own diagnosis because we lacked available on-the-spot resources to enable us to do so. But of those of which we were certain, we did not find a single case in which Arigó was at fault."

Puharich also found that Arigó was phenomenally accurate in making out his prescriptions, despite the fact that each took him only a few seconds and he never looked at what he was writing. Many of these were complex, covering up to fifteen different drugs and giving medical and registered trade names, correct quantities, ratios and recommended dosages. For about five per cent of the patients that passed him, Arigó made a

specific diagnosis but would prescribe only the comment, "Sorry, I can do nothing for you," and Puharich's team confirmed that all of these were hopeless terminal cases.

When asked how he managed to do these things, Arigó simply said that a voice spoke to him in his right ear. He identified his invisible assistant as a German physician, a certain Dr. Fritz, who died in Estonia in 1918. He in turn is said to call when necessary for a second opinion on the spirits of a Japanese surgeon and a French specialist. Despite biographic details of these three obtained through Arigó, all attempts to trace them have so far failed.

It was only in the last years of his life, following his release from prison where he served two sentences for practising medicine without a licence, that Arigó turned exclusively to diagnosis. Before his trial, he performed thousands of elaborate operations with table knives and scissors in totally unsterile conditions, while surrounded by mobs of children. His work has been described as like "doing surgery in the middle of London's Victoria Station in the rush hour". Puharich tells of an operation he witnessed on a patient suffering from a disease of the lower intestine. "Arigó told the man to drop his pants. Then he picked up a knife, wiped it on his shirt, slit the man open, pulled the patient's abdominal muscles apart, brought out the intestines and coolly chopped off a section as you would slice a sausage. Arigó then held the two ends of the bowel, put them back and pulled the stomach walls together . . . he never used sutures. And to cap it all, Arigó gave the chap a big punch in the belly and said, 'that's it'." [64]

Operations like this have been filmed several times by independent teams, and blood samples later identified as belonging to the patient involved, so there is absolutely no question of those present hallucinating or being hypnotized into believing that they saw surgery. Nobody can hypnotize a camera. Summing up their study of Arigó, Puharich said, "He does it. I can't tell you how. His one-man output per week is equivalent to that of a fairly large hospital, and I suspect that its batting average is just as good. At the moment we are preparing our material in the hope that some medical journal will accept our

evidence." That was in 1968, but the report still waits for professional publication. And, in the meantime, Arigó has died.

Fortunately, there are others. I have seen them.

The island of Luzon is the largest and most densely populated in the Philippine archipelago, famous for its fertile valleys where rice, tobacco and sugar-cane flourish, but now it has become important for another product. One hundred kilometres north of Manila and fifteen degrees from the equator, is a small agricultural area that has produced a new and incredible crop of healers. Strangely, there is a connection between this outpost and Arigó's state of Minas Gerais in Brazil. In these two places there are flourishing chapters of the Spiritist Society started in 1857 by the French mystic León Denizarth Hippolyte Rivail, better known under his pen-name of Allan Kardec.[140]

Kardec believed that salvation was not possible without charity. He taught that the greatest gift it was possible to bestow in charity was health, and that this could only be passed on by co-operation with spirits that lived in an invisible world where health was organized and controlled. In Brazil there are about four million Spiritists and several huge hospitals where emphasis is placed on the treatment of psychological disorders, but in the comparatively small community in the Philippines, they treat any kind of physical complaint.

Most of the Luzon healers belong to the Union Espiritista Cristiana de Filipinas, a loosely co-ordinated group of little country churches, where the talent of many has been released following personal contact with each other. Their training involves only prayer, humility and a familiarity with those parts of the Christian Bible in which healing is mentioned—they place particular importance on Psalm 119. Few of the healers have any schooling and none of them know much about medicine, or understand what they do, or how; but all of the thirty or more now practising perform major surgical operations with their bare hands.

In three separate visits to the Philippines, making a total of eight months of intensive research there, I saw over a thousand operations performed by twenty-two different healers. Each has

a slightly different technique, but this operation is typical, and is taken from a recording I made at the time:

"The patient is a middle-aged woman, barefoot and dressed in a faded floral skirt and white cotton shirt. I am told she has a persistent pain in the stomach. She lies down on the wooden table which I have just examined minutely. There is no possibility of anything being concealed on or under it. The healer's assistants roll up her shirt and tuck it into her brassière. I watch like a hawk. Nothing suspicious. Her skirt is unbuttoned and pulled slightly away and a towel is placed over the garment to keep it dry. I am allowed to examine the towel and find it innocent, if none too clean. She lies still with her arms beneath her head, frightened perhaps but totally trusting. The healer comes in. He is dressed in cotton trousers and a lightweight, short-sleeve shirt. He grins disarmingly and turns slowly like a fashion model to show me that there is nothing up his sleeves. He places both his bare hands lightly on the woman's stomach and just holds them there while he closes his eyes. He is standing on her right side and lifts his left hand to put it on her forehead, keeping his right resting over her navel. He says something in the local dialect of Ilocano. I am told it is a prayer. Everything is now very quiet. The healer begins. He takes a piece of cotton-wool from a roll which I have myself provided, dips it in a pink plastic bowl which I filled five minutes ago from the tap, and swabs over her abdomen, rubbing quite hard, three, four times. Now he starts a kneading motion, pushing the tips of all ten fingers into her skin so that water from the cotton collects there and runs down her side on to the table. The healer grips a fold of flesh between the thumbs and fingers of both hands and raises it slightly, then pushes down more firmly than before. He is now working just to the right of her navel and suddenly there is red colour. It could be blood. At first it is watery, mixing with the moisture on her skin, but now it darkens and gurgles quite strongly up between his fingers. I can see no wound. Slowly he pulls his hands about ten centimetres apart and I can see what looks like connective tissue, thin, almost transparent, obviously elastic, red and bloody. There is a lot more red liquid now and it

is starting to stain the towel. I am about one metre from the woman on her left side and I lean closer still. The healer kneads her abdomen a little more, the fingers of his left hand seem now to penetrate into the flesh up to the second joint and they are covered in red. He pulls his hands apart again and gestures to me with his eyebrows to look at the tissue more closely. The cotton wool has now been completely replaced by what looks like flesh. I put out my free left hand and touch it. It is warm and wet and coagulation is starting to form little liver-like chunks on the surface. I wipe some off with my fingers and it feels sticky. I smell it. I am certain it is blood. I can see deeper into the mess now. The healer is pushing into her abdomen and a lot of blood has collected into two pools in the hollow he has made. As his fingers move like someone scrabbling a hole in wet sand, I catch glimpses of white brighter mesentery down below. I can see a fan of capillaries attached to what looks like a part of the small intestine. My face is just a hand's breadth from the surface. He is pressing down very hard. Now he splays his right hand and between the first and second fingers a large round lump begins to grow. It rises as I watch. I can hardly believe it. In seconds it has grown to the size of a tennis ball, not quite spherical, and still attached down below. An assistant reaches over from the right and grips the ball with a pair of forceps. It is soft and elastic and comparatively bloodless. He pulls at it and it lifts a little way clear of the surface. The healer says something to him. Someone hands over a large pair of scissors and the assistant begins to snip away at the base of the ball. It seems to be connected now only by a band of tissue, but his hand is shaking. Finally it comes clear and he lifts it off. I put out my hand for it and he drops it into my cupped palm like a serving of blancmange. It is warm and when I press it, only a little blood oozes out. It seems to be hard inside. I drop it into the pink basin and return to the action. The healer is still standing with his left hand in her body rummaging around a little, making squishy noises, looking up at the ceiling. Now he stops, pulls his hands together as though moulding something in clay. Rubs his hands one over the other, spreading the blood up to his wrists and slowly flattening out his palms. They are both right

on the surface now and there is less blood around. I can no longer see any of the subcutaneous tissue. Suddenly he stops what he is doing, lifts his hands up together, empty, and walks away to wash. The assistant on his right takes a wad of dry cotton and wipes it across her stomach, sweeping the blood away. There is no wound. He uses the towel now to dry her off completely and I rub my hand over her skin. It is hot, but there is nothing on it, not a mark of any kind. Someone speaks to her and she opens her eyes, pulls down her shirt, buttons her skirt, climbs slowly off the table and an old man helps her walk away."

Afterwards, I examined the ball of tissue again. It looked like a tumour and was smaller than it seemed to be when I first held it, although it had not been moved from the bowl at my side. I cut it open with a knife and found the inside partly filled with a mass of fibres laced through the tissue. An American girl who was watching the operation showed me three polaroid photographs she had taken while the tumour was rising and being cut.

I have quoted at this length from my notes to try and give some idea of what the operations are like. The whole process lasts about five minutes and is very matter-of-fact. There is little or no showmanship, no music or drums or incense, nothing to divert the attention from what is going on.

During the last three years there has been a great deal of publicity, both good and bad, concerning the Philippine healers. Tens of thousands of foreign patients have been attracted to Manila. Where there is such a demand, accompanied as it is by the offer of considerable sums of money from desperate people, there will be those who will do anything to meet that demand and obtain the proffered rewards. Healing has become a big business in Manila and, as such, it is inevitably beginning to suffer from commercial ills. There are charlatans posing as healers and healers cashing in by using fraudulent techniques to bolster their own talents when these fail under pressure.

None of this is surprising. But it is sad that the commotion should be allowed to obscure the fact that something very extraordinary still happens in the Philippines. There are still real healers at work, and it is still possible to see them if you are pre-

pared to take your time and not be discouraged by the raucous mercenary front in the city.

Tom Valentine, a journalist from Chicago, made his own careful investigation and concluded, "I was convinced that the operations in that house on that morning were not wrought by sleight of hand. We were not hypnotized, and I certainly wasn't allowing myself to be suggestible. . . . Psychic surgery is not impossible, not fakery, not hypnotic suggestion, not a hoax, not a miracle and is not limited to the Philippines,"[273] He is right, but it is only on Luzon that anyone can see it a hundred times a day, every day.

In March 1973 and again in April 1975, George Meek led a team of scientists to the Philippines. These were experts in medicine, psychiatry, biology, physics, chemistry, parapsychology and even conjuring, from seven different countries. They brought with them numbers of their own patients and quantities of sophisticated equipment. They saw many healers in action, and although they were able to recognize and discard several fraudulent practices, they agreed that "the factual existence and daily practice of several types of psycho-energetic phenomena by several native healers was clearly established. The practice of materializing and dematerializing human blood, tissue and organs as well as non-human objects was found." All members of the groups signed testimonies which declared that, in at least those operations done by healers they considered creditable, there was no fraud, there were no anaesthetics, no sterile precautions and no cases of infection or post-operative shock.

One of the team was himself the subject of an operation. Donald Westerbeke, a biochemist from San Francisco, suffered from loss of vision produced by a brain tumour that was diagnosed in the United States as inoperable. He had two sessions with Tony Agpaoa of Baguio and his vision was immediately restored. On return to the States, his physicians could find no trace of the tumour. Olga Farhit of Los Angeles suffered from paralysis produced by a disease involving deterioration of the bone marrow in her head and shoulders—a condition determined by biopsy at Mount Sinai and the Cedars of Lebanon hospitals in 1965. Agpaoa removed a "tremendous mass of

cartilage and blood" and on her return to Los Angeles, X-rays and tissue samples were taken at St. Vincent's Hospital. Her surgeon commented, "I don't know what to say, but there's nothing left except scar tissue. It's like something went in and cleaned you out."[273]

The Luzon healers are particularly adept at removing diseased tissue, blood clots and pus. I have seen them treat appendicitis, excise growths from the breast, remove cysts and bladder stones, shrink varicose veins and haemorrhoids and even treat several types of cancer with apparent success. In all these cases, it seems that the cures are real and permanent. Sigrun Seutemann, a physician and homeopath from Karlsruhe, has made a dozen trips to the Philippines, taking a total of over a thousand patients from Europe, and her case histories show dramatic proof of improvement. There is naturally still room for argument about whether the cures were effected physically by the healers or psychosomatically by the patients. The final verdict on the healer's medical prowess will have to wait for a long term, large-scale, before-and-after study by a professional team; but in the meantime there is, for me at least, a more exciting aspect to this phenomenon.

Every single one of the healers, every day of their lives, demonstrates the repeated ability to materialize and dematerialize living tissue. In the operations I saw, I could never be certain that the body wall had been opened, but there was absolutely no doubt about the reality of the blood and tissue that appears on the surface. I took blood samples from a friend before, during and after a simple operation on a cyst on her arm, and supervised their typing in a laboratory in Manila City. They were all the same blood. Hiroshi Motoyama had blood obtained during an operation on a Japanese woman typed by the medical school at Tokyo University and it matched that of a sample taken later from the patient by a hospital in Chiba.[189] But the gory mess in which the healers dabble so impressively does not always come from inside the patient's body.

In one series of tests conducted by the Swiss psychiatrist Hans Naegeli, the blood samples taken during the operations failed to match any of the patients involved. Two of the three samples

were identical and the third was not even human but apparently from a sheep—despite the fact that the nearest sheep to the Philippines may be those in Australia.[199] Seutemann watched more than six thousand operations and she estimates that the body is opened in only a very small percentage and then only by the most developed of the healers, particularly Tony Agpaoa. She also feels that the tissue which materializes on the surface of the body is non-human in about ninety-eight per cent of all the operations.

This does not mean that any kind of fraud need be involved. I have watched a number of operations under conditions so carefully controlled that there was no possibility of sleight-of-hand or of the tissue being prepared before the operation or being concealed in any way—and yet it still appeared.

On one occasion a healer came to have a meal with me in my hotel in Manila. While we sat together, he was approached by an American lady I knew by sight. She had never met him, but wanted to know if he could possibly find the time to treat her before she returned to the States the following morning. He was reluctant to do anything at that late hour, but when I offered them the use of my room he agreed to try. He agreed also to give me this chance to eliminate any suspicions I might have about the source of the tissue that customarily appears on the surface of the patient's body in his treatments.

I took him immediately up to my room. He stripped and allowed me to make a thorough search of him and to lock his clothes in my cupboard. He wore only a pair of my own thin cotton shorts. The patient was similarly searched and agreed to be treated, lying on my hotel bed, with not even the usual towel as covering. I and a friend drew up chairs and sat and watched the entire proceedings from a distance of less than two feet.

The healer used no water, no cotton-wool, no oils—nothing which could be prepared in any way to produce chemical reactions that would simulate blood or tissue. And yet despite all these precautions, after he had manipulated the surface of her abdomen for less than three minutes, a red liquid appeared on her skin which, on subsequent analysis, proved to be blood of a group appropriate to her own. A little later in the treatment, the

healer also succeeded in producing a small quantity of tissue, about ten grams, which I collected and sealed in a specimen jar with the object of typing it when I could get to the laboratory the next day. But I never did get that analysis. Although the jar never left my pocket, the next morning it was still sealed, but it was empty. The sample had vanished as though it had not been completely materialized in the first plate.

For centuries there have been reports of mediums who could materialize things or produce ectoplasm, but these have been fleeting phenomena, notoriously difficult to investigate. But here in the Philippines, we have materialization and subsequent dematerialization taking place hundreds of times every day, on demand and at will, in broad daylight.

I spent several days working with Josephine Sison of Barongobong in the Pangasinan lowlands and saw her perform over two hundred operations, about 85 per cent of which involved materialization phenomena. At no time was I more than a foot away from her and not once while she worked did her hands move out of my sight, but she was able to produce blood-like fluid from her fingertips whenever she pressed them against a patient's body. Sometimes the red liquid was accompanied by small pieces of tissue and on several occasions there appeared totally foreign objects. I saw her draw a rusty nail, two complete cobs, several large plastic bags, a film canister, three undamaged leaves still attached to a twig from a thorn bush and a piece of jagged glass from the body surface of a series of patients. In every case the objects seemed to grow in the space between her fingers and the skin. I am totally convinced that no sleight-of-hand was involved and equally certain that these objects did not come from within the patients concerned. This leaves me with the following possibilities. Either I was deluded or was being hypnotized (both unlikely explanations due to the fact that several of the operations in question were successfully filmed), or Sison is capable of bringing about controlled materializations.

Some of the healers also produce psychokinetic effects with the same nonchalance. I have seen Juan Blance of Pasig make real incisions in the bodies of his patients, but without a knife

and from a distance. He simply points his finger at the skin and a cut appears instantaneously—about two centimetres long and a few millimetres deep. Naegli comments: "At a distance of about twenty centimetres from the body, often using the right forefinger of a bystander or his own forefinger, he points at a spot on the body where he wishes to make an incision. A cut appears, it seems almost instantaneously. It is a clean cut, with a few drops of blood, not a steady flow. The subcutaneous tissue can be seen and the patient can feel the cut."[257] The cut appears in the same way even if a sheet of plastic foil is placed between Blance and the patient, and when the operation is complete, a thin scar line is left as evidence. On several occasions I was able to control these operations by bringing along my own patients and ensuring that Blance touched no part of their bodies before he produced his incisions from a distance. There is no question of a concealed blade being involved under these conditions.

Jose Mercardo of Bagag in Pangasinan, uses a similar ability to give what he calls "spirit injections". He lines his patients up against one wall of his clinic and walks down the row with nothing in his hands, making motions with his finger like a small boy "zapping" friends with an invisible raygun. Each of the patients feels a pinprick on that part of the body being pointed at, and most ooze a spot of blood from the "puncture".

One day I joined the line. When he pointed his finger at my bicep, I felt a sharp localized pain. When I rolled up my sleeve there was a tiny puncture wound of the kind one would expect to have been produced by a needle, and a drop of blood. The shirt seemed to be totally undamaged.

As a western scientist, one thinks first of mechanical solutions. I toyed briefly with the notion of a concealed laser beam, but soon discounted this on the grounds that this man could not have concealed, would not have been able to afford and could never have manipulated a laser in this way. I thought of equipment capable of firing minute projectiles of water, ice or even blood, and then discontinued this line of enquiry for similar reasons.

I came back the following morning with very simple equipment designed to test some of the possibilities inherent in the situation. I placed a folded sheet of polythene, four layers thick,

over my bicep and held it in place with a rubber band beneath my cotton shirt. Then I joined the line again.

Mercardo made his customary gesture in my direction from a distance of about five feet. I felt nothing and told him so, asking if he would try again. He repeated the process from three feet away. This time I felt the prick and when I removed the pad, I found the usual puncture and a drop of blood, which I collected on a microscope slide for analysis. Five minutes later I squeezed out a second drop for the sake of comparison.

I found also that the sheet of polythene had been pierced in the area directly over the wound as though a cold needle had been run right through all four layers. An inch away from this point, probably in the area corresponding to Mercardo's first "injection", there was another puncture in the material, but this time passing through only two of the four layers as though his strength from a distance of five feet was not sufficient to penetrate my experimental barrier. This made some kind of sense, but the problem was that it was the innermost two layers, those closest to my skin, that had been punctured.

When the blood samples were typed in a Manila laboratory later that same day under my personal supervision the second one proved to belong to a group the same as my own, but the first was totally foreign to me. It wasn't even human; the red corpuscles had nuclei.

The presence of the holes in the polythene layers nearest my skin seemed to cancel out the possibility of the healer being able to project some kind of energetic ray. The existence of non-human blood made it seem equally unlikely that I alone was involved in the phenomenon, and yet the presence of a very real puncture wound through which my own blood did ultimately ooze, made the whole thing very personal. We know that it is possible for the body to produce hysterical stigmata in this way. I have seen a fakir in Madras make the hands of a member of the audience bleed by hypnosis; and Stephen Black has a patient who was able to produce an appropriate puncture mark and swelling, when simply reminded of an injection given twenty years previously.[20] But Mercado's injections are obviously not of this kind, because plastic is hardly susceptible to hysteria.

Since my experience, others have tried to identify the phenomenon by using capacitor plates and other electronic apparatus, but without success. On occasion the apparatus fails to work, but more often the response fails to appear in the presence of instrumentation that would establish its reality beyond all reasonable doubt. After all my time in the Philippines, I am satisfied that the elusiveness of the phenomena has nothing to do with deliberate fraud or an unwillingness to perform in the presence of scientific equipment for fear of being found out. The fault seems to lie in the instruments themselves and in the experimental attitude which they engender.

Our tools are designed to cope with objective everday reality, because this is the only one our system recognizes. They are not designed to deal with mental and psychic factors or the kinds of interaction which can occur between two or more minds. And I believe that in unorthodox healing we are dealing with events in this area, with an order that is based on another level of reality.

Meek ends his pilot study with the words, "At this time there is no one theory or combination of scientific theories which can adequately explain the phenomenon."[179] This is true, but I think that we are getting close to some understanding. The key lies in a comment made by someone who is naturally able to see human auras. She watched Agpaoa at work and said that, while he was healing, she could see bright beams of light beneath his hands, blue from one and yellow from the other. It is inconceivable that a group of country healers could all afford, or be able to surreptitiously manipulate, a laser apparatus sophisticated enough to be concealed in their bodies, so it seems more reasonable to assume that bioplasma is intimately involved in the phenomena of psychic surgery.

Motoyama has tested Agpaoa in his laboratory in Tokyo and found that his physiology changes dramatically while he is exercising his healing powers.[188] His brain waves produce a predominant alpha rhythm, galvanic skin response increases, and his plethysmograph recordings (blood pressure) show a rhythm which fluctuates in a way that suggests that the parasympathetic nervous system is involved. This is the system that

communicates directly with those areas that are marked by the points known to yoga as *chakras*, the energy centres that seem to be directly associated with the acupuncture meridia. Everything points to the conclusion that Agpaoa, and possibly other healers like him, are able to assume a state that gives them access to their own unconscious processes, and that it is in this condition that they can control the action of an energy that could be the one called bioplasma.

The healers do not know what they are doing, and I cannot pretend that we are much the wiser for describing an extraordinary process in terms of something else we know next to nothing about, but I believe that what we have here is a tiny handhold on a new and other kind of reality. For a scientist like myself, the experience available in the Philippines is shattering. One's first reaction is to throw up all kinds of protective barriers and say, "No! This is impossible. It cannot happen and therefore it does not exist." But it does happen and anyone can see it. No special equipment and no acts of faith are required, just a ticket to Manila. Psychic surgery is the first universally available, non-narcotic method of "stopping the world". It is, in Carlos Castaneda's words, a way "to break the dogmatic certainty, which we all share, that the validity of our perceptions, or our reality of the world, is not to be questioned".[44]

Reality is only a description and, if there are other realities, then there must be other descriptions. George Meek felt as I did after seeing the healers at work and tried to explain the scientific dilemma in which he found himself. "Twentieth Century Man is so physically and materialistically oriented that he is totally incapable of thinking of himself in terms of his own individual etheric, astral, mental and causal or spiritual bodies. Even a very well educated patient is totally incapable of visualizing himself and all living matter as a complex interlocking series of scintillating and pulsating energy fields."[179] I would say that the problem is especially acute for an educated person, because he has been exposed for that much longer to the specific interpretations of reality that we in the West have learned to make in common, and to accept as exclusive fact.

The most dramatic and obvious aspect of the Luzon healing

process is the manifestation of living tissue. The reason for this phenomenon may lie in the fact that it *is* so impressive. I have seen several spiritualist healing sessions in London that involved only prayer and the laying-on-of-hands and must admit that after the first few minutes I was bored, although it is quite conceivable that there was as much real healing taking place as at any clinic in the Philippines. Perhaps the only difference is in the window-dressing and that all cures are psychosomatic and self-administered, but that those in Luzon succeed particularly well simply because they stimulate patients by the dramatic expedient of providing all the necessary and expected "blood and guts". And yet, there is evidence which shows that something concrete and measurable passes from the healer to his plants or his patients.

We do not have all the facts we need to understand exactly what is taking place, but I think that the balance already comes down in favour of the assumption that there is more to a living body than meets the casual eye. The visual evidence of high-frequency apparatus; the efficacy of acupuncture; the description of the aura as seen by sensitive people, and the corroboration of this description in eastern philosophy; the diagnostic ability of those who lack medical training and the usual electronic aids; the prevalence and accuracy of out-of-body experiences; the reality of telepathy and its relationship to the energy described as bioplasma; the proof of psychokinesis under controlled conditions; and now the repeatable macroscopic materialization of living tissue—all these point directly to the conclusion that the body must operate on at least one other level beyond that we know, and have minutely described, as the physical or somatic system.

Mystics have long held this to be true and have, on purely subjective evidence, developed elaborate models of seven different levels and seven states of consciousness.[38] These may well be accurate and meaningful, and it is vital that introspective exploration of this kind should continue, but I believe it to be equally important that research keep pace on the more materialistic front. Our language and our thoughts are steeped in the grammar of technology and we must use this vocabulary

if we want to communicate effectively with large numbers of people. It is said that science is limited to the discovery of local laws and is incapable of reaching finality on cosmic issues,[79] but I suspect that these limitations are ones of procedure and attitude and are not inherent in the method itself. The lines of research covered in these chapters all stem from what I believe to be scientific pursuits, some more imaginative than others, but even the most fanciful benefits by being couched in the language of our time. When we deal with subjects of such fundamental importance to everyone as life and death, it is vital to do so as simply and as directly as possible.

To the scientist and mystic alike, life is divisible. It consists of the dynamic processes of generation, growth, degeneration and death in matter, all according to the established laws of thermodynamics as they apply to normal space-time. But it also consists of other processes that do not necessarily obey the same laws.

On all the evidence available to us, and that of psychic surgery is only the most accessible and dramatic, the other levels are closely associated with, but also relatively independent of, physical matter. The healer operates entirely on the second system, effecting cures by the manipulation of that level with the substance of his own equivalent level, and probably recruiting the active but unconscious assistance of the patients by the physical productions that accompany his treatment. The fact that the healer himself accomplishes complex diagnosis, the delicate operation and the associated and very shrewd diversion all unconsciously, makes it necessary to assume that he in turn is being manipulated. And herein lies the crunch.

I can, to my own intellectual satisfaction, cope with all the contradictions in the life and death relationship that give rise to the confusion of life and death. I can trace the development of our attitudes to death in the light of our growing understanding of the mechanics of life. I experience no difficulty in coming to terms with the altered states of awareness made possible by new chemicals and the re-discovery of old techniques. I find no problems inherent in the fact that personality can be dissociated and even completely disconnected from its base in the body. I

can even reconcile the facts of obsession, possession, hauntings and poltergeists with the framework of the life sciences as they stand now modified by the discoveries of the past few years.

But I have trouble with the kind of control I find in psychic surgery. I can see no way of accounting for meaningful, directed, intelligent guidance of this kind, without assuming that there is an organization or a design behind all life that goes beyond natural selection, chance, causality or even the complete survival of an integrated personality.

I am driven to the conclusion that there is form in the void. You may call it God if you like.

Conclusion

I AM very conscious of the fact that the end of this book is not the end of the argument. My writing ends where it has done, because I have reached a personal turning point. I am confident that the obvious gaps in our understanding of the complex relationship between life and death will soon be closed and that, given the time to come to terms with this new knowledge, we can learn to avoid the Romeo Error. But I am much less confident about the next step.

Physically, I shall be returning for a longer and closer look at the Luzon healers. Mentally, I face a more difficult journey that only begins in the Philippines, for it is there that I am confronted with something rather alarming. There is a barrier in action. Not just a limit to understanding brought about by our lack of knowledge, but an absolute embargo on certain kinds of information.

When a patient with a metal hip joint is brought to the Philippines for the sole purpose of investigating the operating procedure, and the healer has worked until all those present can see the shape of the prosthesis, and the cameras are about to take the critical film that will prove beyond doubt that the body really has been opened—the lights fail. When a research physicist on his own and without equipment goes to visit a healer, he sees hundreds of psychokinetic effects; but when he returns with electronic apparatus that will record the types and quantities of energy involved—nothing happens. When a healer succeeds in physically removing a bladder stone of a peculiar shape, and the specimen is being carried carefully back to

Europe to be matched with existing X-ray pictures, and prove that it is in fact the identical calculus—it vanishes completely from the sealed jar.

These are not isolated incidents that can be shrugged off as accidents. They are taken from a very long series to which everyone who has ever tried to investigate the Philippine phenomenon is an unwilling contributor. Films can be taken of the operations, but it has not yet been possible to produce a single picture that provides completely unequivocal proof of the procedure. Experiments can be conducted, but something always goes wrong just before they reach a level of accomplishment that would make them academically acceptable.

Scientifically, this is an absurd situation, but it is not unique to the Philippines. When comparing notes with those working in other parts of the world, I learn of poltergeists that leap into action the moment an experimenter dismantles his apparatus; of vital tape recordings that burst into flame as they are about to be played back; of crucial witnesses who disappear without trace. It is easy to dismiss all these things as coincidence or experimental error until you know the people involved. None of them is incompetent or paranoid, or has a vested interest in creating confusion; all of them would rather get a straightforward uncomplicated answer to their inquiries. But, like it or not, it appears that some things cannot or will not be known. Or at least not by our present approach.

So we try to find new and less direct approaches, but it seems that there is a line beyond which we cannot move at any one time. Later, this threshold may be lifted and suddenly everyone will be getting results to a problem that a year ago seemed insoluble. Science often works like this, but in these particular fields it begins to look as though the obstructions are set up deliberately—either to thwart us altogether, or to programme our access to new information so that we do not travel too far or too fast. It is possible that we are doing battle on these frontiers with our own unco-operative unconscious minds; or, as some suggest, that we are kept in check in our planetary kindergarten by a cautious cosmic nanny.

I do not know the answer, but I am beginning to learn that

the builder of this barrier is not necessarily always benign. I will go on with the search for a new way to gain the understanding we need, but I must admit that right now on the edge of this unexpected chasm, I am a little afraid.

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